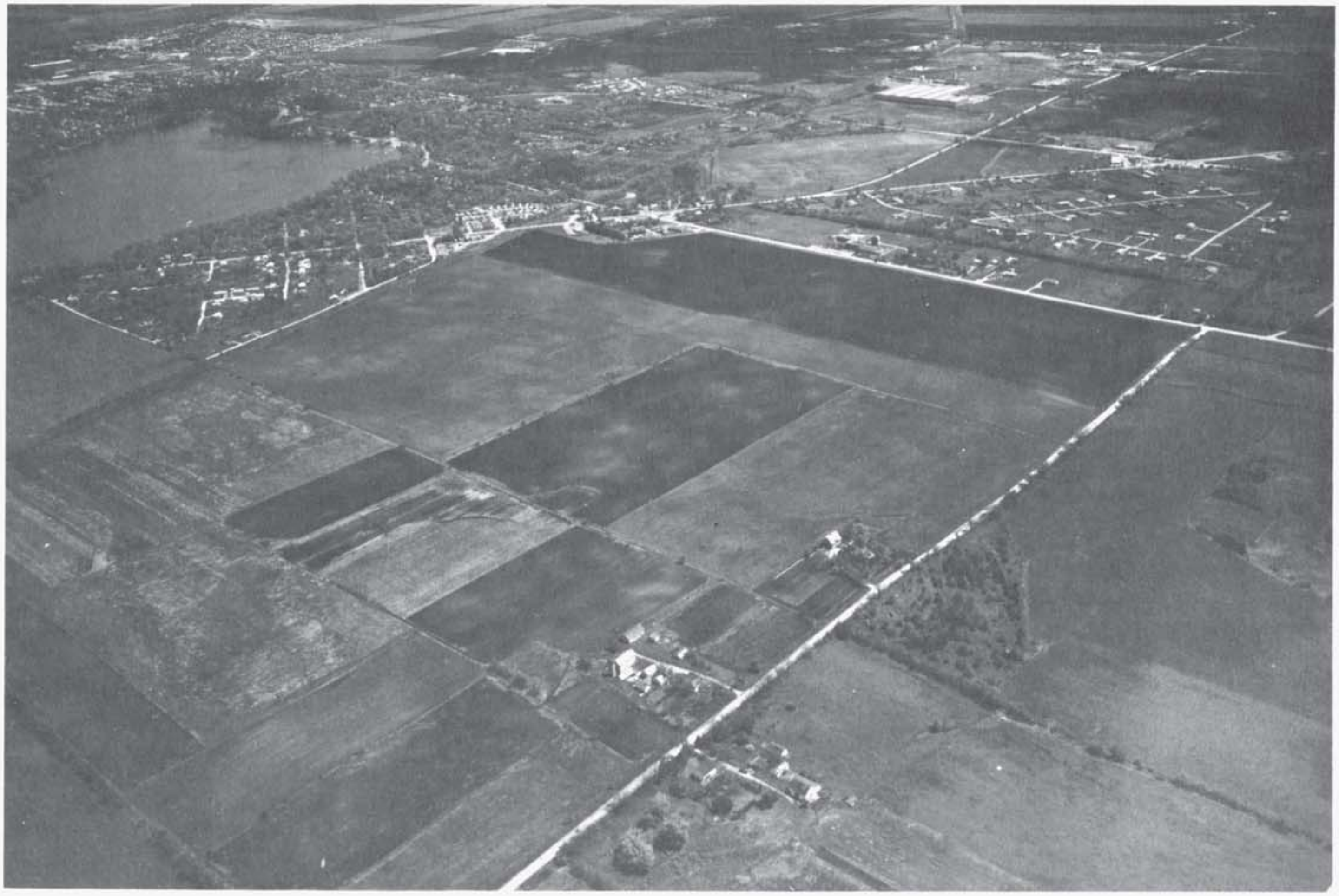
Issued September 1970

SOIL SURVEY
Lake County, Illinois



UNITED STATES DEPARTMENT OF AGRICULTURE
Soil Conservation Service
In cooperation with
ILLINOIS AGRICULTURAL EXPERIMENT STATION

Major fieldwork for this soil survey was done in the period 1960–65. Soil names and descriptions were approved in 1966. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1965. This survey was made cooperatively by the Soil Conservation Service and the Illinois Agricultural Experiment Station. It is part of the technical assistance furnished to the Lake County Soil and Water Conservation District.

Preparation of this Soil Survey was financed partly by the Lake County, Ill., Board of Supervisors.

Either enlarged or reduced copies of the soil map in this publication can be made by commercial photographers, or they can be purchased, on individual order, from the Cartographic Division, Soil Conservation Service, United States Department of Agriculture, Washington, D.C. 20250.

Illinois Agricultural Experiment Station Soil Report No. 88

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, or other structures; and in judging the suitability of tracts of land for agriculture, industry, or recreation.

Locating Soils

All of the soils of Lake County are shown on the detailed map at the back of this survey. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number shown on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbol. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information in the survey. This guide lists all of the soils of the county in numerical order by map symbol. It shows the page where each kind of soil is described and the page for the management group. It also shows the wildlife group, tree planting group, shrub and vine planting group, and recreational group in which each individual soil has been placed.

Interpretations not given in this publication can be developed by grouping the soils according to their suitability or limitations for a particular use. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussion of management groups, wildlife groups, tree planting groups, shrub and vine planting groups, and recreational groups.

Foresters and others can refer to the sections "Woodland" and "Tree Plantings" where the soils of the county are grouped according to their suitability for trees.

Game managers and sportsmen can find information about soils and wildlife in the section "Plantings for Wildlife Habitat."

Engineers and builders can find under "Engineering Uses of the Soils" tables that give engineering descriptions of the soils in the county and that name soil features that affect engineering practices and structures.

Scientists and others can read about how the soils were formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Lake County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the section "General Nature of the County," which gives additional information about the county.

Cover picture: In foreground is farmland on soils of the Elliott-Markham association. In left background is Diamond Lake and the town of Diamond Lake.

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Contents

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SOIL SURVEY OF LAKE COUNTY, ILLINOIS

BY JOHN E. PASCHKE, SOIL CONSERVATION SERVICE, AND JOHN D. ALEXANDER, UNIVERSITY OF ILLINOIS

SOILS SURVEYED BY L. J. BUSHUE, R. H. HERMAN, K. C. HINKLEY, E. E. KUBALEK, R. H. NEWBURY, J. E. PASCHKE, H. R. SINCLAIR, AND P. S. WATTERS, SOIL CONSERVATION SERVICE

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE ILLINOIS AGRICULTURAL EXPERIMENT STATION

LAKE COUNTY is in the northeastern corner of Illinois (fig. 1). It extends approximately 24 miles from north to south and 20 miles from east to west and has an area of 292,480 acres, or 457 square miles. The population, estimated at 335,000 persons in 1965, is concentrated mainly in the eastern part of the county. Waukegan is the largest town and the county seat.

The acreage used for urban development and recreation is increasing, but the county is predominantly farmland, mostly used for cash crops. By far the largest acreage is in corn.

General Nature of the County

By 1834 permanent settlers had begun to arrive in the area that, in 1839, became Lake County. They settled first along the Des Plaines River. By 1851 grain, wool, and other farm products were being exported from the port of Waukegan.

The population, usually, has increased more than 35 percent each decade. From 18,257 persons in 1860, the population had increased to 293,656 by 1960, and it was estimated to be about 335,000 in 1965 (*7*) [1].

In 1960 about 234,379 acres was farmland or open space. By 1965 the area occupied by 1,332 commercial farms totaled 141,874 acres. This figure does not include the acreage in specialized farms, open or vacant land, or surface water. Seven-tenths of the acreage in specialized farms, which include mink farms, research farms, and nursery farms, is in the townships of Libertyville and Vernon. The rest of the acreage in the county is used as follows: 27,121 acres for residences, 1,137 acres for commercial business, 661 acres for commercial amusement, 1,872 acres for industry, 14,378 acres for public and quasi-public use, and 20,061 acres for transmission facilities (*6*).

Providing transportation in the county are several railroads that supply freight and passenger service, two buslines, two high-speed highways, several large airports, and ships plying the Great Lakes.

[1] Italic numbers in parentheses refer to Literature Cited, page 80.

Physiography and Drainage

Lake County is in the Wheaton Morainal country of the Great Lakes section of the Central Lowland province. In general, it has gently sloping relief and poorly defined

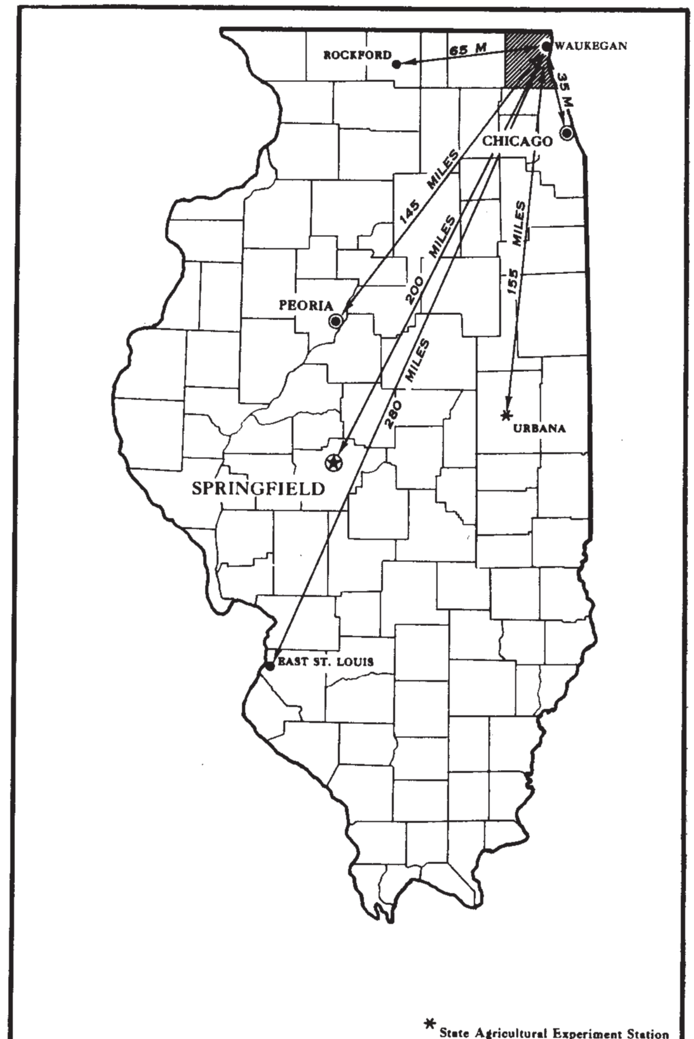

Figure 1.—Location of Lake County in Illinois.

drainage patterns. Many drainageways terminate in depressions and marshes.

From the highest point on Gander Mountain in the northwestern corner of the county to the lowest point in the southeastern corner, where the Des Plaines River flows out of the county, the difference in elevation is about 340 feet.

A strip approximately 2 or 3 miles wide at the easternmost edge of the county drains into Lake Michigan. About two-thirds of the total land area of the county drains into the Des Plaines River, which flows from north to south. The westernmost part of the county drains westward into the Fox River Basin. Both the Des Plaines River and the waters associated with the Fox River Basin drain eventually into the Mississippi River and the Gulf of Mexico.

Water Supply

In most of Lake County, drilled wells are the main sources of water. Wells supplying individual homes usually have been drilled into the glacial drift, which is about 200 feet thick, but those supplying villages have been drilled into bedrock aquifers. A few individual homes use surface water for sanitary facilities but not for human consumption. Lake Michigan is the main source of water for the cities and villages of Bannockburn, Deerfield, Fort Sheridan, Gurnee, Highland Park, Highwood, Lake Bluff, Lake Forest, North Chicago, Waukegan, Winthrop Harbor, and Zion and for the Great Lakes Naval Training Center.

Climate [2]

Lake County has a typical continental climate, characterized by frequent changes in temperature, humidity, cloudiness, and wind direction. Prolonged warm spells in summer are infrequent. Major droughts are infrequent, but rather long spells of dry weather during the growing season are not unusual.

Even though the eastern border of the county is along the shore of Lake Michigan, the lake has little effect on climate in the county. For example, a breeze off the lake may cause the temperature to drop 10° or 15° F. on a summer afternoon, but this cooling effect seldoms extends more than a few miles inland and often less than a mile. In winter, an easterly wind may be warmed as much as 20° as it passes over the lake, but this warming effect is too infrequent to be considered a real climatic factor.

Temperature and precipitation data based on the combined records from Antioch and Waukegan are given in table 1. The probability of and the dates when specified temperatures can be expected are given in table 2. The chances of receiving a specified amount of precipitation during 1-week and 2-week periods are shown in table 3. These data are representative of Lake County.

The temperature exceeded 100° F. in about half the summers during the period 1931 through 1947, but it has not been above 100° in any summer during the period 1948 through 1965. It has reached 90° or above on an average of only 13 days a year. July is normally the warmest month and August is nearly as warm. January is normally the coldest month, and February has periods as cold but usually of shorter duration. The temperature falls to 32° or below on 135 to 140 days in an average year. A record low temperature of −24° was reached on February 23, 1933. The average annual temperatures at Antioch and Waukegan differ by less than one-fifth of a degree, and the highest and lowest temperatures recorded each year at both places seldom differ more than 1° or 2°.

The average length of the growing season in Lake County is about 155 days; along Lake Michigan the growing season is approximately 10 days longer. The term "growing season" is somewhat misleading because

[2] By WILLIAM L. DENMARK, climatologist for Illinois, (ESSA), Department of Commerce.

TABLE 1.—*Temperature and precipitation data*

[Data for temperature and rainfall based on records for the period 1931–60; data for snowfall based on records for the period 1950–65. All data represent a combination of records from Antioch, elevation 752 feet, and Waukegan, elevation 680 feet]

Month	Temperature				Precipitation			
	Average daily maximum [1]	Average daily minimum [1]	Record highest	Record lowest	Average total	One year in 10 will have— Less than—	One year in 10 will have— More than—	Average snowfall
	°F.	°F.	°F.	°F.	In.	In.	In.	In.
January	31	15	64	−23	1.8	0.7	3.0	9.5
February	34	17	66	−24	1.4	.3	2.4	6.9
March	43	25	83	−14	2.4	1.2	3.8	9.0
April	57	37	92	11	3.2	1.2	5.5	.8
May	68	46	95	26	3.7	1.2	6.4	(2)
June	78	56	105	32	3.7	2.1	6.1	0
July	83	61	108	41	3.3	.8	5.4	0
August	82	61	101	40	3.2	1.1	8.0	0
September	75	53	103	27	3.3	1.0	8.4	(2)
October	63	43	89	11	2.5	.3	4.7	(2)
November	47	30	80	−5	2.2	.8	4.9	2.4
December	34	19	66	−20	1.8	.6	2.9	8.6
Year	58	39	108	−24	32.5	22.2	41.9	37.2

[1] Average daily temperature for any month is the average of the average daily maximum and the average daily minimum.

[2] Trace.

TABLE 2.—*Probability of freezing temperatures in spring and in fall*

[All data based on temperatures recorded in a standard U.S. Weather Bureau shelter approximately 5 feet above the ground and in a representative location. At times the temperature is colder nearer the ground or in local areas subject to extreme air drainage]

Probability	Dates for given probability and temperature				
	32° F.	28° F.	24° F.	20° F.	16° F.
Last in spring:					
Average date	May 7	April 23	April 5	March 26	March 16
25 percent chance after	May 16	May 2	April 14	April 4	March 25
10 percent chance after	May 24	May 10	April 22	April 12	April 2
First in fall:					
Average date	October 10	October 25	November 5	November 14	November 24
25 percent chance before	October 1	October 16	October 27	November 5	November 15
10 percent chance before	September 24	October 9	October 20	October 29	November 8

TABLE 3.—*Chances of receiving a specified amount of precipitation during 1-week and 2-week periods*

1-week period	Probability of receiving at least—			
	Trace or less	0. 40 inch or more	1 inch or more	2 inches or more
	Pct.	*Pct.*	*Pct.*	*Pct.*
March 1-March 7	17	38	11	1
March 8-March 14	19	48	19	4
March 15-March 21	9	55	24	6
March 22-March 28	9	54	24	6
March 29-April 4	15	56	21	3
April 5-April 11	11	57	23	5
April 12-April 18	9	48	20	5
April 19-April 25	11	58	30	10
April 26-May 2	18	58	28	7
May 3-May 9	13	55	26	7
May 10-May 16	8	64	36	14
May 17-May 23	15	62	31	8
May 24-May 30	9	70	40	14
May 31-June 6	8	69	41	17
June 7-June 13	15	65	43	21
June 14-June 20	17	51	24	7
June 21-June 27	11	60	34	13
June 28-July 4	11	59	31	10
July 5-July 11	13	58	31	11
July 12-July 18	9	44	18	4
July 19-July 25	24	49	25	8
July 26-August 1	17	49	23	6
August 2-August 8	9	60	32	11
August 9-August 15	13	58	32	12
August 16-August 22	11	55	32	15
August 23-August 29	26	44	22	7
August 30-September 5	17	45	22	7
September 6-September 12	6	63	34	13
September 13-September 19	17	54	32	14
September 20-September 26	17	57	35	15
September 27-October 3	24	48	27	12
October 4-October 10	22	52	32	14
October 11-October 17	24	44	18	4
October 18-October 24	20	50	21	4
October 25-October 31	24	45	16	3
November 1-November 7	35	43	18	4
November 8-November 14	22	47	20	5
November 15-November 21	26	42	18	5

2-week period	Probability of receiving at least—		
	Trace or less	1 inch or more	2 inches or more
	Pct.	*Pct.*	*Pct.*
March 1-March 14	2	38	11
March 15-March 28	2	54	22
March 29-April 11	2	57	17
April 12-April 25	2	55	25
April 26-May 9	4	57	25
May 10-May 23	2	67	34
May 24-June 6	0	76	44
June 7-June 20	4	64	37
June 21-July 4	0	64	19
July 5-July 18	0	52	23
July 19-August 1	4	50	22
August 2-August 15	0	64	33
August 16-August 29	7	55	29
August 30-September 12	2	57	28
September 13-September 26	2	61	35
September 27-October 10	7	53	31
October 11-October 24	4	43	16
October 25-November 7	9	39	14
November 8-November 21	6	41	17

different crops are damaged at different temperatures. Also, temperatures on ridges differ considerably from temperatures in valleys during radiation freezes, the type most common in Illinois. Crops grown in closed depressions, where Houghton and Peotone soils occur, are likely to be damaged by frost in May and October. Table 2 shows the last date in spring and the first in fall when specified temperatures may be expected (*5*). The data in this table are based on instrument readings taken above ground level. Frost may occur at ground level when the temperature in the instrument shelter is above freezing.

Winter months are the cloudiest. The percentage of possible sunshine ranges from an average of less than 45 for the period November through February to nearly 70 for the period July through August.

Precipitation averages slightly less than 33 inches a year. More than half falls during the growing season, May through September. Less than 26 inches can be expected 2 years in 10 and more than 40 inches 2 years in 10. Precipitation averages less than 2 inches a month from December through February but more than 3 inches a month from April through September. The monthly total has ranged from only a trace, in October 1952, to more than 10 inches, in October 1941 and September 1945. Precipitation of 0.1 inch or more can be expected on 65 to 70 days and 0.5 inch or more on 20 to 25 days in an average year. Table 3 shows the chances of receiving a specified amount of precipitation during 1-week and 2-week periods, but these data are more useful as indications of seasonal patterns than of weekly contrasts.

In summer most of the rain falls during showers or thunderstorms of short duration. The average number of thunderstorms a year is 35. One thunderstorm frequently produces more than an inch of rain. Hail and damaging winds occasionally accompany the thunderstorms. The hail is most likely to damage growing field crops if it falls during the period June through August, but hail-producing thunderstorms average less than one in any one place during this period in any one year (*4*). Not all hailstorms have stones of sufficient size and quantity to damage crops extensively.

During the period 1950 to 1965, the average snowfall amounted to 35 to 40 inches a year, and it was not unusual for half this amount to fall in 1 month. Ninety percent falls during December through March. Average snowfall, by months, is shown in table 1. These data are based on the combined records from Antioch and Waukegan. In about 70 percent of the winters, Waukegan has more snow than Antioch. In the winter of 1964–65, it had a total of 75 inches, but in the winter of 1951–52, Antioch had 65 inches, or 12 inches more than Waukegan.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soils are in Lake County, where they are located, and how they can be used.

They went into the county knowing they were likely to find many soils they had already seen and perhaps some they had not. As they worked in the county, they observed steepness, length, and shape of slopes; geological features; kinds of native plants or crops; and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by roots of plants.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. To use this publication efficiently, it is necessary to know the kinds of groupings most used in a local soil classification (*11*).

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, the major horizons of all the soils of one series are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Houghton and Miami, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the natural, undisturbed landscape.

Soils of one series can differ in texture of the surface soil and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Miami silt loam, 2 to 4 percent slopes, is one of several phases within the Miami series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from the aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some other kind that have been seen within an area that is dominantly of a recognized soil phase.

In preparing some detailed maps, the soil scientists have a problem of delineating areas where two or more soils occur together without regularity in pattern or relative proportion. The individual tracts of the component soils could be shown separately on the map, but the differences are so slight that the separation is not important for the objectives of the survey. They show these soils as one mapping unit and call it an undifferentiated group. An example of an undifferentiated group is Wauconda and Beecher silt loams, 0 to 2 percent slopes.

Most surveys include areas where the soil material is so marshy, so disturbed by man, or so frequently worked by wind and water that it cannot be classified by soil series. These areas are shown on the map like other mapping units, but are given descriptive names, such as Beach sand or Made land, and are called land types.

While a soil survey is in progress, samples of soils are taken, as needed, for laboratory measurements and for engineering tests. Laboratory data from the same kinds of soils in other places are assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kinds of soils. Yields under defined management are estimated for all the soils.

But only part of a soil survey is done when the soils have been named, described, and delineated on the map, and the laboratory data and yield data have been assembled. The mass of detailed information then needs to be organized in such a way as to be readily useful to different groups of readers, among them farmers, managers of woodland, engineers, and homeowners. Grouping soils that are similar in suitability for each specified use is the method of organization commonly used in soil surveys. On the basis of the yield and practice tables and other data, the soil scientists set up trial groups. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others and then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under present methods of use and management.

General Soil Map

The general soil map at the back of this publication shows, in color, the soil associations in Lake County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and several minor soils, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of farming or other land use. Such a map is not suitable for planning the management of a farm or field, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect management.

The 11 soil associations in Lake County are described in this section. More detailed information about the individual soils in each association can be obtained by studying the detailed map and by reading the section "Descriptions of the Soils."

1. Marsh-Fox-Boyer association

Wet, marshy areas and level to rolling, well drained to moderately well drained soils that are moderately deep over sand and gravel and have rapid to moderate permeability

This association occurs mainly as one large area in the northwestern part of the county and one in the northeastern part. A couple of small areas are located farther south along the western boundary. The large area in the northwestern part consists of nearly level deposits of outwash gravel; a gravelly, hilly moraine to the east of the outwash deposits; and, east of the moraine, a lowland occupied partly by lakes, marshes, and the Fox River. The small areas along the western boundary consist of outwash gravel. The area in the northeastern part borders Lake Michigan. Prominent in this area are beach ridges formed of thick deposits of sand. These ridges extend about a quarter of a mile back from the lake. The slopes are 25 to 100 feet long. West of the ridges is a marshy area that has a rank growth of cattails. A bluff borders the marshy area on the west, and beyond that are nearly level, thick deposits of gravel and sand.

This association makes up about 8 percent of the county. It is about 35 percent Marsh, 30 percent Fox and Boyer soils, 25 percent Rodman, Casco, Plainfield, and Houghton soils, and 10 percent other minor soils.

Marsh is covered with water for long periods of time. In the area along Lake Michigan, Marsh occurs as a narrow area between the lake and bluff, north of Waukegan, and consists of undecomposed organic matter over gray sand. In the northwestern part of the county, Marsh occurs among the lakes and consists of undecomposed organic matter over loamy material.

Fox soils are well drained or moderately well drained, and Boyer soils are well drained. Both have a brown or reddish-brown subsoil. Fox soils formed in 2 to 3 feet of loamy material over calcareous sand and gravel. Boyer soils formed in 2 to 3 feet of sandy material over calcareous sand and gravel.

Rodman and Casco soils are the steepest soils in the association. Casco soils consist of a thin layer of loamy material over calcareous sand and gravel, and Rodman soils formed in sand and gravel. Plainfield soils are nearly level to gently sloping, deep sands. They are on narrow ridges next to Lake Michigan. Houghton soils are organic soils. They are level or depressional and are covered with water part of the time.

Those tracts in the western part of the county are in the Chain o' Lakes-Fox River recreational area. They have been used predominantly for resorts and summer cottages, but the trend is toward year-round residences concentrated near the lakes. A substantial acreage is idle land. The tract along Lake Michigan is largely urban. It includes Illinois Beach State Park.

For the sandy and gravelly soils in this association, inadequate available moisture capacity and low fertility are the most serious limitations. Septic tank systems in these soils function well but can cause contamination of the water wells nearby. For Marsh and the Houghton soils, wetness is a severe limitation in urban development or recreational use.

2. Mundelein-Pella-Barrington association

Level to gently sloping, poorly drained to well-drained, deep soils that have moderate permeability

This association occurs as five small areas in the west-central, south-central, and east-central parts of the county. Its topography is smoother than that of other associations. The slopes are smooth and uniform, and closed depressions are fewer than in most parts of the county. All the major soils formed in material deposited by glacial meltwater. The acreage of organic soils is small. Figure 2 shows the relationships of soils and underlying material in association 2.

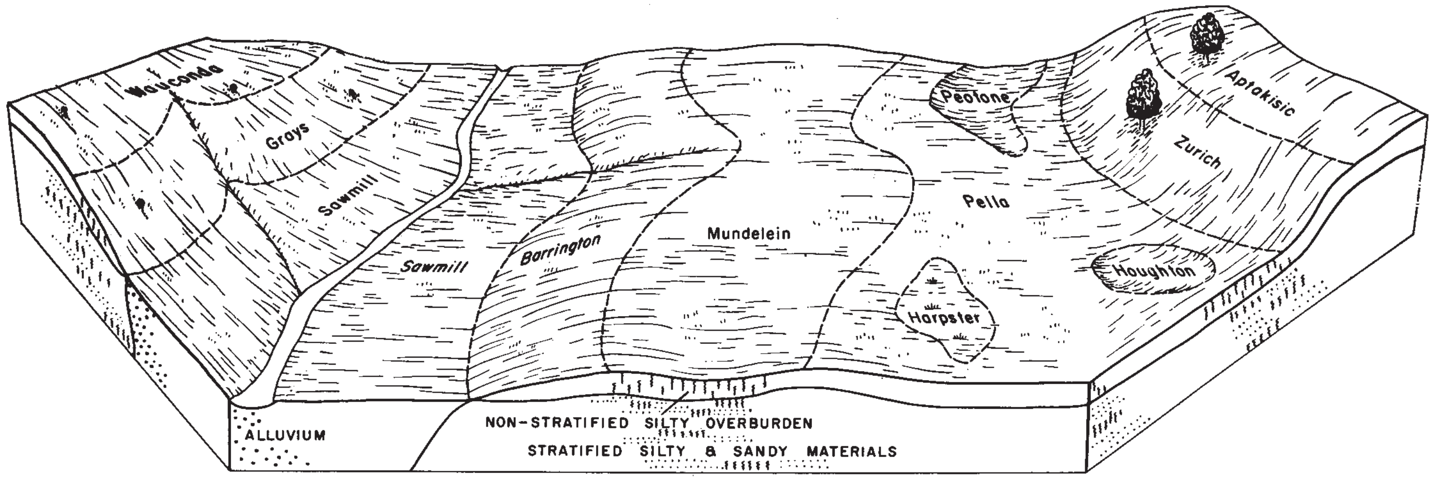

***Figure 2.*—Parent material and position of soils in associations 2 and 3.**

This association makes up about 2 percent of the county. It is about 38 percent Mundelein soils, 21 percent Pella soils, 9 percent Barrington soils, 7 percent Peotone soils, and 25 percent other minor soils.

Mundelein soils are nearly level to gently sloping and are somewhat poorly drained. They have a dark grayish-brown, mottled layer in the upper part of the subsoil and underneath that a light olive-brown layer.

Pella soils are on the lower parts of the landscape and are poorly drained.

Barrington soils are nearly level or gently sloping and are well drained to moderately well drained. They have a brown layer in the uppermost part of the subsoil and underneath that a dark yellowish-brown layer.

Peotone soils are on the lower parts of the landscape and are very poorly drained. They are under water more frequently than Pella soils.

Some of the best soils for farming in Lake County are in this association, but much of the acreage is in other uses. One area adjoins Third Lake and Druce Lake and is within the Chain o' Lakes-Fox River recreational area. This area has been used predominantly for resorts and summer cottages, but the trend is toward year-round residences concentrated near the lakes. General farms are still to be found in this area, and the acreage of idle land is large. An area along the Skokie River, south of Waukegan, is rapidly being subdivided for homes and public facilities. In the other areas, general farms and specialized farms still exist, and some land is idle, but urban developments, concentrated along the roads, are dominant.

Drainage and maintenance of fertility and tilth are the chief management problems. Control of water erosion is a problem on the gently sloping soils. Septic tank systems in the low soils are likely to give trouble during wet weather.

3. *Zurich-Grays-Wauconda association*

Nearly level to moderately steep, well-drained to somewhat poorly drained, deep soils that have moderate permeability

This association occurs as numerous small areas in all parts of the county, but about half the acreage lies along the Fox River and the Des Plaines River. Along these rivers no distinct terraces or bluffs separate the flood plains from the uplands. The low areas in the western half of the county include large acreages of organic soils, but those in the eastern half of the county include little or no acreage of organic soils. Areas in the western part of the county have a morainal topography characterized by moderate or stronger slopes 100 to 200 feet long. Areas in the central part of the county have the topography typical of outwash plains characterized by gentle slopes in most places and moderate slopes in some places. The other areas are level to gently sloping.

This association (see fig. 2) makes up about 11 percent of the county. It is about 25 percent Zurich soils, 15 percent Grays soils, 15 percent Wauconda soils, 21 percent Pella, Peotone, and Houghton soils, and 24 percent other minor soils.

Zurich and Grays soils are more sloping than other soils in this association. Both are well drained to moderately well drained. Grays soils have a thicker surface layer than Zurich soils. Both have a brown or dark yellowish-brown subsoil.

Wauconda soils are nearly level to gently sloping and are somewhat poorly drained. They have a dark grayish-brown to light olive-brown, mottled subsoil.

Pella, Peotone, and Houghton soils occupy the lower positions in the landscape. Pella soils are poorly drained, and Peotone soils are very poorly drained. Houghton soils are level or depressional, very dark colored, very poorly drained, organic soils. The proportion of Houghton soils is greater west of the Des Plaines River than east of it and is greatest near the western boundary of the county.

The areas of this association in the eastern part of the county are used predominantly for urban developments, but there is a small acreage of farmland and some idle land. Some areas are in the Chain o' Lakes-Fox River recreational area. These areas have been used predominantly for summer cottages, but the trend is toward year-round homes concentrated near the lakes. The other areas consist of scattered developments around the lakes and roads, parcels of idle land, and scattered farms. In the valley of the Des Plaines River are many gravel pits and potential sources of gravel.

Control of water erosion on the gently sloping to moderately steep soils, drainage of the wet soils, and maintenance of fertility and tilth are management problems. Septic tank systems in the low soils are likely to give trouble during wet weather.

4. *Corwin-Odell association*

Level to gently sloping, well-drained to somewhat poorly drained, deep soils that have moderate permeability

This association consists of two areas west of the Des Plaines River. One area is adjacent to or within a few miles of the river. A small area extends through the southeast corner of Ela Township and the southwest corner of adjoining Vernon Township. Both of these areas have morainal topography characterized by irregular, elongated hills and low areas that ribbon around them. The soils on the hills have nearly level to gentle slopes that are 100 to 300 feet long. In the low areas are a few spots of organic soils. Figure 3 shows the relationships of soils and underlying material in association 4.

This association makes up about 4 percent of the county. It is about 34 percent Corwin soils, 18 percent Odell soils, 29 percent Pella and Peotone soils, and 19 percent other minor soils.

Corwin soils occupy the higher parts of this association. They are well drained to moderately well drained soils. They have a brown to dark yellowish-brown subsoil.

Odell soils are nearly level and somewhat poorly drained. They have a dark grayish-brown to dark yellowish-brown, mottled subsoil.

Pella and Peotone soils occupy the lowest positions in this association.

Some of the best farm soils in Lake County are in this association, and a sizable acreage is used for specialized farming. Urban expansion, mostly near the lakes and roads, has changed the pattern of land use.

Drainage of the wet soils, maintenance of fertility and tilth, and on gently sloping soils, control of water erosion are management problems. The compact substratum in these soils may hinder sewage disposal if the septic tank filter field is installed in it. Septic tank systems in the low soils are likely to give trouble during wet weather.

5. *Miami-Montmorenci association*

Gently sloping to strongly sloping, well drained to moderately well drained, deep soils that have moderate permeability

This association occurs as several areas in the northern part of the county and two areas in the southern part near the western boundary of the county. It is characterized by many hills, mounds, closed depressions, and valleys. The hills are irregularly shaped and elongated. No distinct terraces or bluffs separate the flood plains from the uplands. Figure 3 shows the relationships of soils and underlying material in association 5.

This association makes up about 7 percent of the county. It is about 36 percent Miami soils, 16 percent

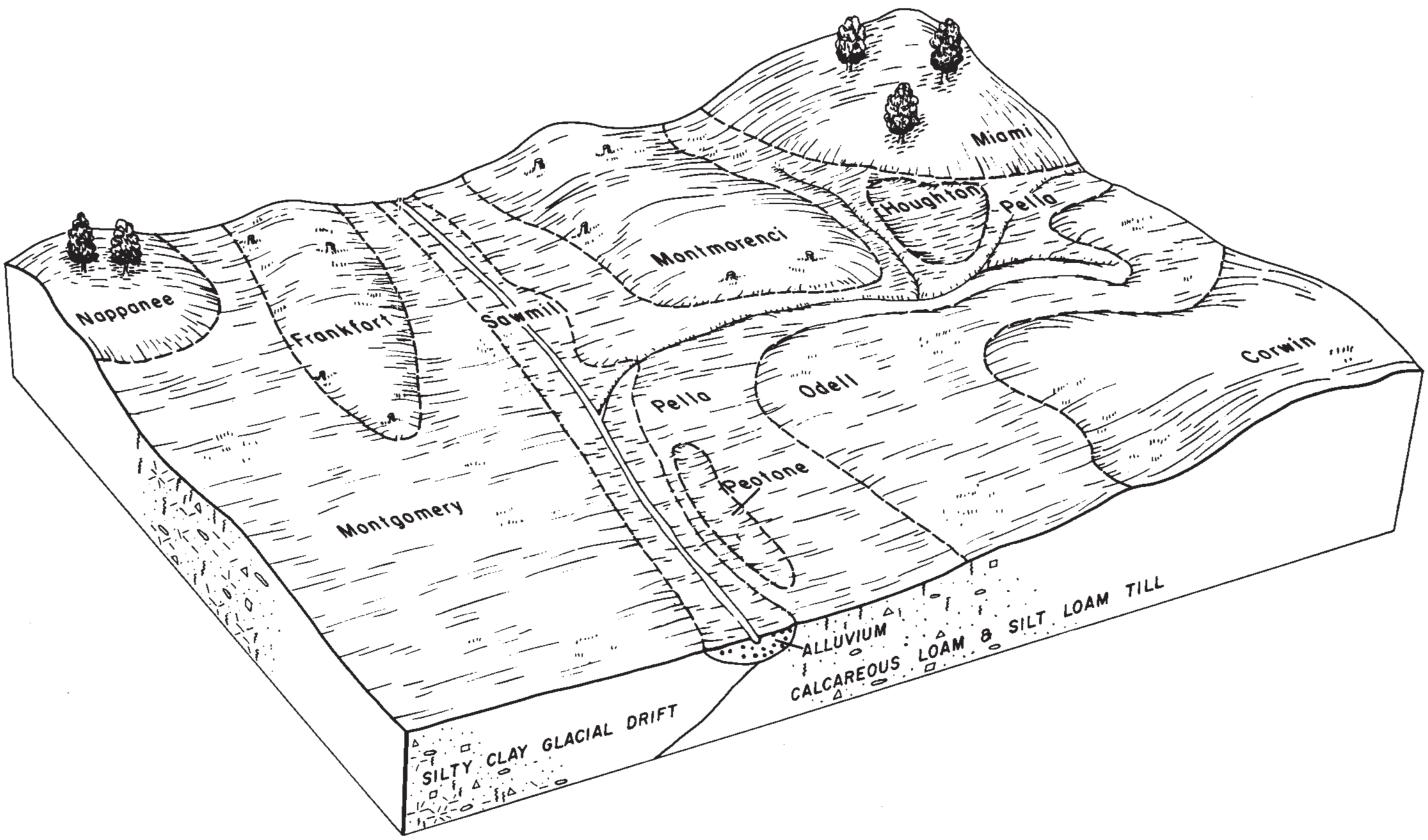

Figure 3.—**Parent material and position of soils in associations 4, 5, 10, and 11.**

Montmorenci soils, 16 percent Pella and Peotone soils, 7 percent Houghton soils, and 25 percent Sawmill, Harpster, Wauconda, Zurich, Grays, Morley, Markham, and other minor soils.

Miami soils are gently to strongly sloping, and Montmorenci soils are gently sloping. Both soils are well drained to moderately well drained. Montmorenci soils have a thicker, darker colored surface layer than Miami soils. Both have a brown or dark yellowish-brown subsoil.

Pella, Peotone, and Houghton soils are on the lower parts of the landscape. Pella soils are poorly drained. Peotone soils are very poorly drained and are ponded more frequently than Pella soils. Houghton soils are level or depressional, very dark colored, very poorly drained, organic soils. The proportion of Houghton soils is greater west of the Des Plaines River than east of the river and is greatest near the western boundary of the county.

Land use is mixed. Urban developments are concentrated near the lakes, the main highways, and the railroads. There are tracts of idle land and scattered general farms and dairy farms.

Control of water erosion on the more sloping soils, drainage of the wet soils, maintenance of fertility, and addition of organic matter are management problems. The compact, calcareous glacial till underlying the Miami and Montmorenci soils may hinder sewage disposal if the septic tank filter field is installed in it. Septic tank systems in the low soils are likely to give trouble during wet weather.

6. Elliott-Markham association

Level to strongly sloping, well-drained to somewhat poorly drained, deep soils that have moderately slow permeability

This association consists of two areas in the south-central part of the county. It is characterized by mounds, closed depressions, and many irregularly shaped, elongated hills. The slopes are 100 to 200 feet long. Figure 4 shows the relationships of soils and underlying material in association 6.

This association makes up about 10 percent of the county. It is about 26 percent Elliott soils; 22 percent Markham soils; 15 percent Barrington, Mundelein, and Varna soils; 7 percent Houghton soils; 8 percent Peotone and Ashkum soils; and 22 percent Grays, Wauconda, Beecher, Zurich, Morley, and other minor soils.

Elliott soils are gently sloping and somewhat poorly drained. They have a brown or dark grayish-brown, mottled subsoil.

Markham soils are on the higher parts of the landscape. They are well drained to moderately well drained. They have a lighter colored surface layer than Elliott soils. They have a brown or dark yellowish-brown subsoil.

Varna soils have a thicker, darker colored surface layer than Markham soils, and they lack a gray subsurface layer. Houghton soils are level or depressional, very dark colored, very poorly drained, organic soils. Peotone and Ashkum soils occupy low parts of the landscape. Both are very dark colored, mineral soils. Peotone soils

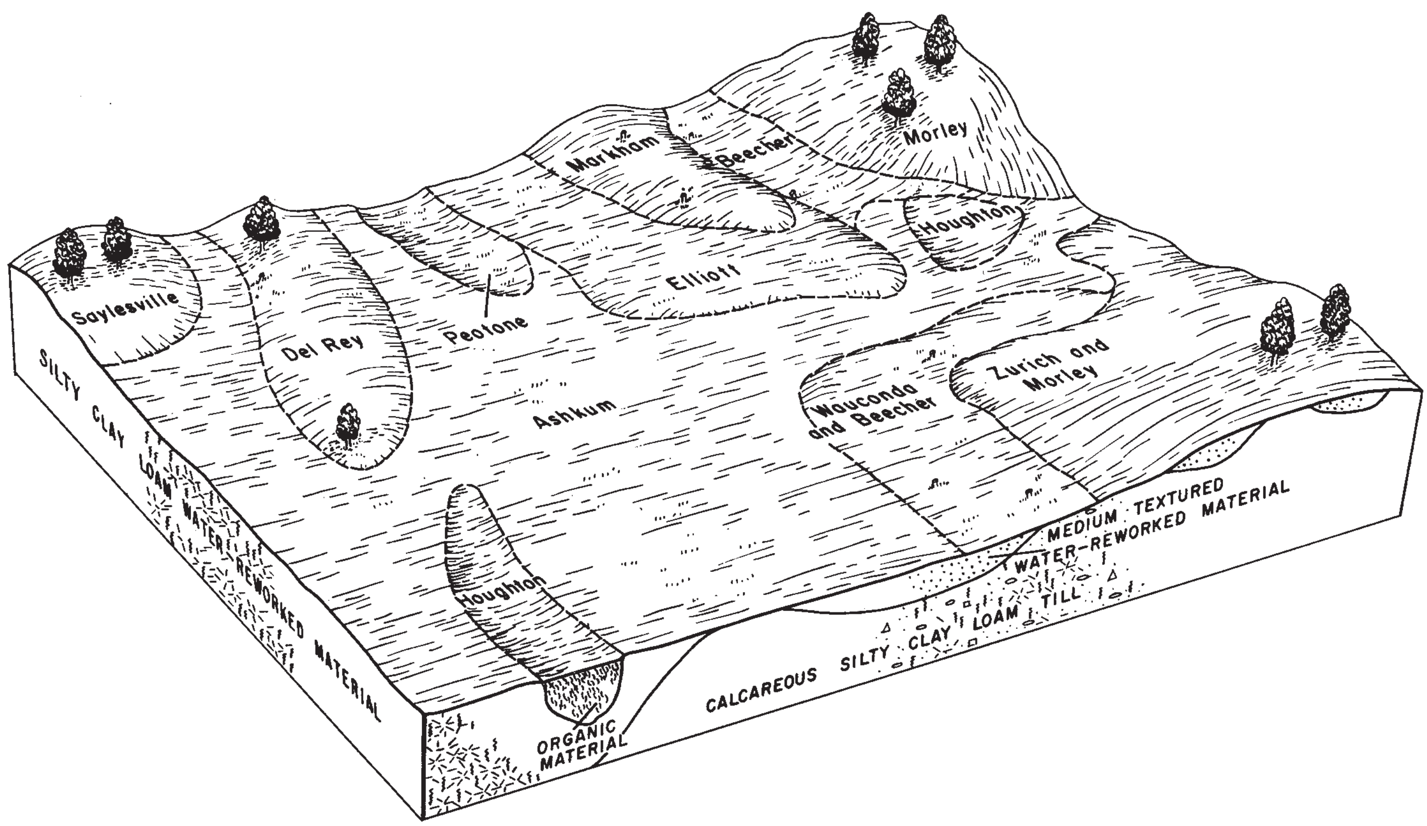

Figure 4.—**Parent material and position of soils in associations 6, 8, and 9.**

are more poorly drained and have a thicker surface layer than Ashkum soils, and they are subject to ponding.

Land use is mixed. Urban developments are concentrated around the lakes and the major highways. There are tracts of idle land and scattered general farms and dairy farms.

Control of water erosion on the sloping soils, drainage of the wet soils, maintenance of fertility, and maintenance of tilth are management problems. The inadequate permeability of these soils hinders sewage disposal if septic tank systems are used. Filter fields in low soils are likely to give trouble in wet weather.

7. *Morley-Beecher-Hennepin association*

Nearly level to very steep, well-drained to somewhat poorly drained, deep soils that have moderately slow to moderate permeability

This association occurs as one long narrow belt that extends along Lake Michigan from the southeastern corner of the county north almost to Waukegan. It consists of relatively level areas and deep ravines. The ravines start at a 60-foot escarpment facing Lake Michigan and cut back into the uplands. Storm water drains through these ravines into Lake Michigan.

This association makes up about 3 percent of the county. It is about 55 percent Morley soils, 15 percent Beecher soils, 12 percent Hennepin soils, and 18 percent other minor soils.

Morley soils are gently sloping and well drained to moderately well drained. They have a light-colored surface layer and a brown to yellowish-brown subsoil. They formed in shallow silty material over calcareous glacial till of silty clay loam texture.

Beecher soils are nearly level to gently sloping and somewhat poorly drained. They have a dark-colored surface layer, a dark-gray subsurface layer, and a dark grayish-brown, mottled subsoil.

Hennepin soils are on the sides of ravines and the escarpment facing Lake Michigan. They are well drained. They formed in calcareous silty, loamy, or sandy glacial material.

In this association, urban developments predominate. They are concentrated on the lakeshore and are made up of towns, subdivisons, and private estates as well as public facilities. Among these facilities are schools, parks, playgrounds, roads, and public buildings.

Because most of the soils have moderately slow permeability, disposal of sewage effluent is a problem if houses are built beyond the existing municipal sewage system. Filter fields in low areas are likely to give trouble in wet weather.

8. *Morley-Markham-Houghton association*

Gently sloping to steep, well drained to moderately well drained, deep soils that have moderately slow permeability; and level to depressional, very dark colored, very poorly drained organic soils

This association occurs as two large areas. One area extends from the northern boundary to the southern boundary in the western and central parts of the county, and the other is in the northeastern part. Both areas consist of mounds, closed depressions, and many irregularly shaped, elongated hills. The closed depressions become more numerous and extensive from east to west and are most numerous and extensive at the western edge of this association. Around the depressions are gently sloping to moderately steep soils that have slopes 100 to 200 feet long. Figure 4 shows the relationships of soils and underlying material in association 8.

This association makes up about 42 percent of the county. It is about 34 percent Morley soils, 16 percent Markham soils, 11 percent Houghton soils, 14 percent Peotone and Ashkum soils, 8 percent Beecher soils, 13 percent Zurich, Grays, Wauconda, and Beecher soils; and 4 percent other minor soils.

Morley and Markham soils occupy the higher parts of the landscape. Both soils are well drained to moderately well drained. Markham soils have a darker colored surface layer than Morley soils. Both soils have a brown or dark yellowish-brown subsoil.

Houghton soils are level or depressional organic soils. Many of the closed depressions in which they occur are not drained and are ponded the year round. These depressions support a rank growth of cattails.

Peotone and Ashkum soils occupy low positions in the landscape, but they are mineral soils. Peotone soils are very poorly drained, and Ashkum soils are poorly drained. Peotone soils have a thicker surface layer and are more frequently ponded than Ashkum soils. Both soils have a surface layer of dark-colored silty clay loam. Beecher soils are nearly level to gently sloping and somewhat poorly drained. They have a moderately dark colored surface layer, a gray subsurface layer, and a dark grayish-brown, mottled subsoil.

The pattern of land use, except in the city of Waukegan, is mixed. Urban developments are concentrated around the lakes and the major highways. There are tracts of idle land and scattered general farms, dairy farms, and specialized farms.

Control of water erosion, drainage of the wet soils, maintenance of fertility, and addition of organic matter are management problems. The moderately slow permeability of these soils may hinder disposal of sewage effluent if septic tank systems are installed. Filter fields in low areas are likely to give trouble in wet weather.

9. *Del Rey-Saylesville-Peotone association*

Level to moderately sloping, somewhat poorly drained to well-drained, deep soils that have moderately slow permeability; and level to depressional, very dark colored, very poorly drained soils

This association occurs as three small areas that once were glacial lakes, one located in the southeastern corner of the county, one northeast of Volo, and one southeast of Cedar Lake. The topography is smoother than that of most other associations in this county. Closed depressions are fewer than in association 8, but surface water ponds in level areas after rain. These soils formed in deep deposits of silt and clay that had thin layers of sand in the lower part. Figure 4 shows the relationships of soils and underlying materials in association 9.

This association makes up about 2 percent of the county. It is about 35 percent Del Rey soils, 20 percent Saylesville soils, 15 percent Peotone soils, 10 percent Ashkum soils, and 20 percent other minor soils.

Del Rey soils are level and somewhat poorly drained.

They have a very dark gray surface layer, a light brownish-gray subsurface layer, and a grayish-brown or light brownish-gray, mottled subsoil.

Saylesville soils occupy the higher parts of the landscape. They are well drained to moderately well drained. They have a brown to dark yellowish-brown subsoil.

Peotone soils are on low parts of the landscape. They are very poorly drained. They have a surface layer of silty clay loam.

Ashkum soils are on low parts of the landscape. They are poorly drained. They have a surface layer of silty clay loam, but they have a thinner surface layer than Peotone soils.

The area southeast of Cedar Lake is in the Chain o' Lakes-Fox River recreational area. It has been used predominantly for resorts and summer cottages, but the trend is toward year-round residences concentrated near the lakes. A substantial acreage is idle land, general farms, or specialized farms. The area northeast of Volo is used for urban developments, which are concentrated around the roads, and for general farms and specialized farms. The other area, in the southeastern corner of the county, is rapidly being subdivided for homes and public facilities.

Drainage of the wet soils, maintenance of fertility, addition of organic matter, and, in gently sloping areas, control of water erosion are management problems. Because of the moderately slow permeability of these soils, the disposal of sewage effluent is a problem if houses are built beyond the existing municipal sewage system. Filter fields in low areas are likely to give trouble in wet weather.

10. Frankfort-Montgomery-Wauconda association

Level to gently sloping, somewhat poorly drained, deep soils that have slow to moderate permeability; and level to depressional, poorly drained to very poorly drained soils that have slow permeability

This association occurs as three small areas; one is near the western boundary in the central part of the county, and the other two are in the southeastern part. The area near the western boundary was once the site of a small glacial lake. It is nearly level; the range in elevation is less than 15 feet. The two areas in the southeastern part of the county were the sites of moraines and small slack-water lakes. They are level to gently sloping; the range in elevation is about 50 feet. About 20 percent of the acreage is ponded after a rain that produces runoff. Figure 3, page 7, shows the relationships of some of the soils and underlying material in association 10.

This association makes up about 4 percent of the county. It is about 41 percent Frankfort soils, 26 percent Montgomery soils, 14 percent Wauconda soils, and 19 percent minor soils.

Frankfort soils are on the higher parts of the landscape. They are somewhat poorly drained. They have a very dark brown surface layer, a dark-gray subsurface layer, and a grayish-brown, mottled subsoil.

Montgomery soils are on the lower parts of the landscape. They are poorly drained to very poorly drained. They have a surface layer of black silty clay.

Wauconda soils are nearly level to gently sloping and somewhat poorly drained. They have a dark grayish-brown to light olive-brown subsoil mottled with yellowish brown.

The area near the western boundary of the county is used for general farming. The other two areas are used mainly for homes and public facilities, but a small acreage is still either farmland or idle land.

Because of the slow permeability of the Frankfort and Montgomery soils, the disposal of sewage effluent is a problem if houses are built beyond the existing municipal sewage system. Because of the wetness, filter fields are likely to give trouble in wet weather.

11. Nappanee-Montgomery association

Level to moderately sloping, somewhat poorly drained soils; and level to depressional, poorly drained to very poorly drained, deep soils that have slow permeability

This association occurs as four areas in the northwestern and the southeastern parts of the county. The two areas in the northwestern part consist of hills and of low areas that have mineral soils in some places and organic soils in others. They are part of an area once occupied by glacial lakes. The two areas in the southeastern part of the county are characterized by hills that have smooth uniform slopes 100 to 200 feet long and by low areas that are periodically ponded. Parts of these areas have morainal topography, and other parts were once occupied by small glacial lakes. The range in elevation in these two areas is less than 50 feet. Figure 3, page 7, shows the relationships of soils and underlying material in association 11.

This association makes up about 7 percent of the county. It is about 54 percent Nappanee soils, 23 percent Montgomery soils, 9 percent Aptakisic and Zurich soils, and 14 percent other minor soils.

Nappanee soils are on the higher parts of the landscape. They are somewhat poorly drained. They have a very dark gray surface layer, a grayish-brown subsurface layer, and a light olive-brown to grayish-brown and gray, mottled subsoil.

Montgomery soils are on the lower parts of the landscape. They are poorly drained to very poorly drained, and many areas are ponded at some time during the year. They have a surface layer of black silty clay.

The areas in the northwestern part of the county are within the Chain o' Lakes-Fox River recreational area. They have been used predominantly for resorts and summer cottages, but the trend is toward year-round residences concentrated near the lakes. General farms are still to be found in these areas, and the acreage of idle land is large. The areas in the southeastern part of the county are rapidly being subdivided for homes and public facilities, but a substantial acreage is idle land and a small acreage is used for cash grain crops and for specialized farming.

Because of the slow permeability of these soils, the disposal of sewage effluent is a problem if houses are built beyond the existing municipal system. Filter fields are likely to give trouble during wet weather.

Descriptions of the Soils

In this section the soils of Lake County are described in detail. The procedure is to describe first the soil series and then the mapping units in that series. Thus, to get

full information on any one mapping unit, it is necessary to read both the description of that unit and the description of the soil series to which the unit belongs.

Each series description contains a short description of a soil profile considered typical of the series and a much more detailed description of the same profile that scientists, engineers, and others can use in making highly technical interpretations. If the profile of a given mapping unit differs from this typical profile, the differences are stated in the description of the mapping unit, unless they are apparent from the name of the mapping unit. Many of the terms used in describing soil series and mapping units are defined in the Glossary, and some are defined in the section "How This Survey Was Made."

The approximate acreage and proportionate extent of the soils are shown in table 4. At the back of this soil sur-

TABLE 4.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Aptakisic silt loam	816	0. 3
Aptakisic and Nappanee silt loams, 0 to 2 percent slopes	928	. 3
Aptakisic and Nappanee silt loams, 2 to 4 percent slopes	385	. 1
Ashkum silty clay loam	13, 265	4. 5
Barrington silt loam, 0 to 2 percent slopes	375	. 1
Barrington silt loam, 2 to 4 percent slopes	1, 102	. 4
Barrington and Varna silt loams, 2 to 4 percent slopes	2, 644	. 9
Beach sand	985	. 3
Beecher silt loam, 0 to 2 percent slopes	6, 155	2. 1
Beecher silt loam, 2 to 4 percent slopes	5, 871	2. 0
Borrow area	998	. 3
Boyer sandy loam, 1 to 4 percent slopes	1, 594	. 5
Boyer sandy loam, 4 to 10 percent slopes, eroded	250	. 1
Casco loam, 3 to 10 percent slopes, eroded	515	. 2
Corwin silt loam, 0 to 2 percent slopes	511	. 2
Corwin silt loam, 2 to 4 percent slopes	3, 395	1. 2
Del Rey silt loam, 0 to 2 percent slopes	1, 192	. 4
Del Rey silt loam, 2 to 4 percent slopes	449	. 2
Dresden loam, 0 to 2 percent slopes	900	. 3
Dresden loam, 2 to 4 percent slopes	745	. 3
Elliott silt loam, 0 to 2 percent slopes	608	. 2
Elliott silt loam, 2 to 4 percent slopes	6, 176	2. 1
Fox loam, 0 to 2 percent slopes	246	. 1
Fox loam, 2 to 4 percent slopes	814	. 3
Fox loam, 4 to 7 percent slopes, eroded	1, 102	. 4
Fox loam, 7 to 12 percent slopes, eroded	770	. 3
Frankfort silt loam, 0 to 2 percent slopes	3, 299	1. 1
Frankfort silt loam, 2 to 4 percent slopes	1, 793	. 6
Granby loamy fine sand	472	. 2
Gravel pits	902	. 3
Grays silt loam, 0 to 2 percent slopes	2, 444	. 8
Grays silt loam, 2 to 4 percent slopes	2, 837	1. 0
Grays and Markham silt loams, 0 to 2 percent slopes	651	. 2
Grays and Markham silt loams, 2 to 4 percent slopes	5, 003	1. 7
Harpster silty clay loam	1, 041	. 4
Hennepin loam, 15 to 30 percent slopes	1, 138	. 4
Hennepin loam, 30 to 60 percent slopes	1, 618	. 5
Houghton muck	9, 931	3. 4
Houghton muck, wet	7, 191	2. 5
Houghton peat, wet	465	. 2
Made land	13, 243	4. 5
Markham silt loam, 1 to 4 percent slopes	6, 064	2. 1
Markham silt loam, 2 to 4 percent slopes, eroded	624	. 2
Markham silt loam, 4 to 7 percent slopes	1, 764	. 6
Markham silt loam, 4 to 7 percent slopes, eroded	8, 851	3. 0
Markham silt loam, 7 to 12 percent slopes, eroded	1, 646	. 5
Marsh	5, 700	1. 9
Martinton silt loam, 0 to 2 percent slopes	480	. 2
Martinton silt loam, 2 to 4 percent slopes	486	. 2
Miami silt loam, 2 to 4 percent slopes	4, 261	1. 5
Miami silt loam, 4 to 7 percent slopes	582	. 2
Miami silt loam, 4 to 7 percent slopes, eroded	2, 167	. 7
Miami silt loam, 7 to 12 percent slopes	239	0. 1
Miami silt loam, 7 to 12 percent slopes, eroded	1, 554	. 5
Montgomery silty clay	7, 373	2. 5
Montmorenci silt loam, 2 to 4 percent slopes	2, 543	. 9
Montmorenci silt loam, 4 to 7 percent slopes, eroded	1, 620	. 5
Morley silt loam, 2 to 4 percent slopes	26, 019	8. 9
Morley silt loam, 2 to 4 percent slopes, eroded	837	. 3
Morley silt loam, 4 to 7 percent slopes	4, 997	1. 7
Morley silt loam,4 to 7 percent slopes, eroded	10, 134	3. 5
Morley silt loam, 7 to 12 percent slopes	1, 492	. 5
Morley silt loam, 7 to 12 percent slopes, eroded	5, 703	1. 9
Morley silt loam, 12 to 25 percent slopes	786	. 3
Morley silt loam, 12 to 25 percent slopes, eroded	2, 788	. 9
Mundelein silt loam, 0 to 2 percent slopes	3, 543	1. 2
Mundelein silt loam, 2 to 4 percent slopes	529	. 2
Mundelein and Elliott silt loams, 0 to 2 percent slopes	1, 644	. 6
Mundelein and Elliott silt loams, 2 to 4 percent slopes	1, 727	. 6
Nappanee silt loam, 0 to 2 percent slopes	2, 904	1. 0
Nappanee silt loam, 2 to 4 percent slopes	6, 025	2. 1
Nappanee silt loam, 4 to 7 percent slopes, eroded	945	. 3
Odell silt loam, 0 to 2 percent slopes	2, 265	. 8
Odell silt loam, 2 to 4 percent slopes	656	. 2
Pella silty clay loam	12, 316	4. 2
Peotone silty clay loam	9, 529	3. 3
Peotone silty clay loam, wet	257	. 1
Plainfield sand, slightly acid variant, 1 to 4 percent slopes	987	. 3
Rodman gravelly loam, 15 to 50 percent slopes	1, 194	. 4
Sawmill silty clay loam	5, 988	2. 0
Saylesville silt loam, 1 to 4 percent slopes	1, 998	. 7
Saylesville silt loam, 4 to 7 percent slopes, eroded	372	. 1
Wauconda silt loam, 0 to 2 percent slopes	4, 800	1. 6
Wauconda silt loam, 2 to 4 percent slopes	1, 083	. 4
Wauconda and Beecher silt loams, 0 to 2 percent slopes	3, 239	1. 1
Wauconda and Beecher silt loams, 2 to 4 percent slopes	1, 676	. 6
Wauconda and Frankfort silt loams, 0 to 2 percent slopes	3, 060	1. 0
Wauconda and Frankfort silt loams, 2 to 4 percent slopes	492	. 2
Zurich silt loam, 0 to 2 percent slopes	1, 592	. 5
Zurich silt loam, 2 to 4 percent slopes	3, 978	1. 4
Zurich silt loam, 4 to 7 percent slopes	411	. 1
Zurich silt loam, 4 to 7 percent slopes, eroded	1, 791	. 6
Zurich silt loam, 7 to 15 percent slopes, eroded	1, 106	. 4
Zurich and Morley silt loams, 2 to 4 percent slopes	3, 667	1. 2
Zurich and Morley silt loams, 4 to 7 percent slopes, eroded	1, 828	. 6
Zurich and Nappanee silt loams, 2 to 4 percent slopes	982	. 3
Water (bodies less than 40 acres in size)	5, 217	1. 9
Intermittent water	1, 150	. 4
Total	292, 480	100. 0

vey is the "Guide to Mapping Units," which lists the mapping units in the county and shows the management group, wildlife group, tree planting group, shrub and vine planting group, and recreational group each mapping unit is in and the pages on which the mapping units and management groups are described.

Aptakisic Series

The Aptakisic series consists of deep, nearly level to gently sloping, somewhat poorly drained soils that formed in 2 to 3 feet of silty material and the underlying calcareous, stratified silt and sand. These soils are mainly in the valley of the Des Plaines River. The native vegetation was hardwood trees.

In a typical profile the surface layer is silt loam about 8 inches thick. It is very dark gray in the upper few inches and light brownish gray in the lower part. The subsoil is about 25 inches thick. It consists of brown silty clay loam mottled with yellowish brown in the upper part, grayish-brown silty clay loam mottled with yellowish brown in the middle part, and mixed gray and yellowish-brown, stratified silt loam and fine sandy loam in the lower part. The underlying material is mixed gray and yellowish-brown, stratified silt loam and fine sandy loam.

These soils are neutral to strongly acid. They have moderate permeability and high available moisture capacity. The water table is within 3 feet of the surface in spring.

Typical profile of Aptakisic silt loam, in a wooded area, 15 feet east of driveway, in the SE¼SE¼NW¼ sec. 11, T. 43 N., R. 11 E.

A1—0 to 2 inches, very dark gray (10YR 3/1) gritty silt loam; weak, very fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—2 to 8 inches, light brownish-gray (10YR 6/2) silt loam; weak, thin, platy structure; friable; strongly acid; abrupt, smooth boundary.

B1t—8 to 10 inches, brown (10YR 5/3) light silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/4); moderate, fine, subangular blocky structure; patchy coatings of light-gray (10YR 7/1) silt on blocks; firm; strongly acid; clear, smooth boundary.

B21t—10 to 14 inches, brown (10YR 5/3) silty clay loam; many, fine, distinct mottles of yellowish brown (10YR 5/4); weak, fine, prismatic structure breaking to moderate, fine to medium, subangular blocky; continuous coatings of light-gray (10YR 7/1) silt on all ped faces; firm; strongly acid; clear, smooth boundary.

B22t—14 to 24 inches, grayish-brown (10YR 5/2) heavy silty clay loam; many, fine, distinct mottles of yellowish brown (10YR 5/4); weak, fine, prismatic structure breaking to moderate, medium, angular to subangular blocky; discontinuous coatings of dark-gray (10YR 4/1) clay on all ped surfaces; firm; medium acid; clear, smooth boundary.

IIB3—24 to 33 inches, mixed gray (10YR 6/1) and yellowish-brown (10YR 5/6), stratified silt loam and fine sandy loam; weak, medium, prismatic structure breaking to weak, medium, angular blocky; friable; calcareous; gradual, smooth boundary.

IIC—33 to 60 inches, mixed gray (10YR 6/1) and yellowish-brown (10YR 5/6 and 5/8), stratified silt loam and fine sandy loam; weak, medium, prismatic structure to massive; calcareous.

The A1 horizon ranges from 7 to 10 inches in thickness. The plow layer is lighter colored where part of the A2 horizon has been mixed with the A1 horizon, and it is darker colored where significant amounts of organic matter have been added. The A1 horizon commonly contains enough sand to have a gritty feel. The gritty feel is less noticeable if the A1 and A2 horizons have been mixed. The B horizon ranges from 16 to 30 inches in thickness. The depth to calcareous material ranges from 24 to 36 inches.

Aptakisic soils have a lighter colored surface layer than Mundelein soils. They have a thinner A1 horizon and a lighter colored, thicker A2 horizon than Wauconda soils. They are somewhat more permeable than Del Rey soils because they are coarser textured in the lower part of the subsoil and in the substratum.

Aptakisic silt loam (365).—This soil is nearly level. Most commonly, it is on second bottoms in the valley of the Des Plaines River. It has the profile described as typical for the series. Included in some of the areas mapped are small areas of Wauconda silt loam, 0 to 2 percent slopes, and small areas of Zurich silt loam, 0 to 2 percent slopes. Also included were small areas that have a little more slope and areas where the depth to calcareous material is more than 36 inches.

The main limitation is a seasonal high water table at a depth of 1 foot to 3 feet. Some areas receive excessive amounts of runoff from adjoining higher areas. (Management group IIw–1)

Aptakisic and Nappanee silt loams, 0 to 2 percent slopes (982A).—These soils are mainly in the eastern part of the county. Some areas contain only Aptakisic silt loam and some only Nappanee silt loam, but most contain some of each. The Aptakisic soil is the more common. The Nappanee soil has a finer textured subsoil and underlying material than the Aptakisic soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Aptakisic soil and underlying material of silty clay like that of the Nappanee soil. Also included were areas of Wauconda and Frankfort silt loams, 0 to 2 percent slopes.

The most serious limitations are a high water table in spring and slow movement of water through the Nappanee soils. The establishment of adequate surface drainage is a serious problem. Much of the acreage is idle or wooded and is near areas of expanding urban development. (Management group IIw–1)

Aptakisic and Nappanee silt loams, 2 to 4 percent slopes (982B).—These soils have short slopes. Generally, they occupy small knolls on the level plain in the eastern part of the county. Some areas contain only Aptakisic silt loam and some only Nappanee silt loam, but most contain some of each. The Aptakisic soil is the more common. The Nappanee soil has a finer textured subsoil and underlying material than the Aptakisic soil. Included in mapping were soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Aptakisic soil and underlying material of silty clay like that of the Nappanee soil. Also included were areas of Wauconda and Frankfort silt loams, 2 to 4 percent slopes.

The most serious limitations are a seasonal high water table and slow movement of water through the Nappanee soil. The hazard of erosion is only slight, partly because of the short slopes and partly because farming is not intensive. Much of the acreage is wooded and is near areas

of expanding urban development. (Management group IIw-1)

Ashkum Series

The Ashkum series consists of deep, level, poorly drained soils that formed in silty and clayey, water-deposited material of variable thickness and the underlying glacial till. These soils are in low areas in all parts of the county. The native vegetation was water-tolerant grass.

In a typical profile the surface layer is black silty clay loam about 12 inches thick. The 38-inch subsoil consists mainly of dark grayish-brown, firm silty clay loam, but the uppermost few inches is very dark gray. The lower part is mixed grayish brown and yellowish brown and is calcareous. The underlying material is mixed grayish-brown and yellowish-brown, compact, very firm, calcareous silty clay loam (glacial till).

Ashkum soils are neutral in reaction. They have moderately slow permeability because of their clayey texture. The available moisture capacity is high. The water table is within 1 foot of the surface in spring but is 1 foot to 4 feet below the surface the rest of the year. The organic-matter content is high.

Typical profile of Ashkum silty clay loam, in a field, 330 feet south of highway center and 12 feet east of farm lane, in the NW¼NE¼SW¼ sec. 30, T. 43 N., R. 11 E.

Ap—0 to 6 inches, black (10YR 2/1) silty clay loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A1—6 to 12 inches, black (10YR 2/1) silty clay loam; moderate, fine to medium, granular structure; friable; mildly alkaline; clear, smooth boundary.

B1—12 to 17 inches, very dark gray (10YR 3/1) silty clay loam; moderate, fine to very fine, subangular blocky structure; clay coatings on all ped surfaces; firm; moderately alkaline; clear, smooth boundary.

B21g—17 to 23 inches, dark grayish-brown (2.5Y 4/2) heavy silty clay loam; few, fine, faint mottles of grayish brown (10YR 5/2); moderate, fine to very fine, subangular blocky structure; coatings of very dark gray (10YR 3/1) clay on all ped surfaces; firm; moderately alkaline; clear, smooth boundary.

B22g—23 to 29 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; common, fine, distinct mottles of light olive brown (2.5Y 5/6 or 5/4); moderate, medium, subangular blocky structure; continuous coatings of dark-gray (10YR 4/1) clay on blocks; firm; moderately alkaline; abrupt, smooth boundary.

IIB31—29 to 35 inches, mixed grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) silty clay loam (glacial till); weak, fine, prismatic structure breaking to weak to moderate, medium, subangular blocky; patchy coatings of dark-gray (2.5Y 4/1) clay on vertical surfaces; firm; moderately alkaline; clear, smooth boundary.

IIB32—35 to 50 inches, mixed grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) silty clay loam (glacial till); weak, fine to medium, prismatic structure breaking to weak, medium to coarse, angular blocky; patchy coatings of dark-gray (2.5Y 4/1) clay on vertical surfaces; firm; calcareous; gradual, wavy boundary.

IIC—50 to 60 inches, mixed yellowish-brown (10YR 5/6) and grayish-brown (2.5Y 5/2) silty clay loam (glacial till); massive; very firm; calcareous.

The A horizon ranges from 12 to 18 inches in thickness. The texture is silty clay loam except in a few areas where there are recent deposits of soil material washed from the surrounding higher areas. The B horizon ranges from 20 to 38 inches in thickness.

Ashkum soils typically have a thinner A horizon than Peotone soils. They have a slightly finer textured subsoil and a finer textured substratum than Pella soils. Ashkum soils have a thicker surface layer than Montgomery soils, and they are coarser textured throughout the profile.

Ashkum silty clay loam (232).—This soil is level and occurs in low positions in the landscape. It is subject to ponding in some places. Included in mapping were small wet areas and small areas of Peotone silty clay loam and Elliott silt loam or Beecher silt loam.

Nearly all the acreage is cultivated. Wetness is the main limitation. Most areas are drained by tile or open ditches and are intensively farmed. The limitations for urban development are serious. (Management group IIw-2)

Barrington Series

The Barrington series consists of deep, level to gently sloping, well drained to moderately well drained soils that formed in 2 to 3 feet of silty material and the underlying calcareous strata of silty material and sand. These soils are on uplands in the southern and eastern parts of the county. The native vegetation was prairie grass.

In a typical profile the surface layer is black to very dark gray silt loam about 12 inches thick. The 30-inch subsoil consists mainly of brown to dark yellowish-brown, firm silty clay loam. In the lower part it is lighter colored, calcareous, and coarser textured. The underlying material is brown, calcareous silty material stratified with thin layers of sand and a few thin layers of gravel.

These soils are slightly acid to medium acid. They have moderate permeability and high available moisture capacity. The water table is generally at least 3 feet below the surface.

Typical profile of Barrington silt loam, 0 to 2 percent slopes, in an open field, 350 feet north of center of blacktop road, 5 feet west of farm lane, in the SW¼NE¼SE¼ sec. 29, T. 43 N., R. 11 E.

A1—0 to 8 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

A3—8 to 12 inches, very dark gray (10YR 3/1) silt loam; very dark grayish brown (10YR 3/2) when crushed; moderate, fine or medium, granular structure; friable; medium acid; clear, smooth boundary.

B1—12 to 18 inches, brown (10YR 4/3) silty clay loam; moderate, very fine, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B2—18 to 31 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, very fine or fine, subangular blocky structure; firm; medium acid; clear, smooth boundary.

IIB3—31 to 42 inches, mixed dark yellowish-brown (10YR 4/4) and pale-brown (10YR 6/3) silt loam; thick, discontinuous, dull coatings of gray (5Y 5/1) clay on all ped surfaces; weak, medium, prismatic structure breaking to moderate, medium or coarse, angular blocky; firm; calcareous; clear, smooth boundary.

IIC—42 to 84 inches, brown (10YR 5/3) silt loam and thin strata of very fine sand; many, fine, distinct mottles of yellowish brown (10YR 5/6); structureless; calcareous.

The A horizon ranges from black to very dark gray in color and from 10 to 13 inches in thickness. Erosion has not been serious enough to expose the brighter colored sub-

soil. Small areas of these soils have some sand in the surface layer. The B horizon ranges from 18 to 30 inches in thickness. The C horizon ranges from brown and grayish brown to yellowish brown in color.

Barrington soils typically have a darker colored surface layer than Grays soils. They are somewhat more permeable than Corwin soils because of the coarser texture in the lower part of the subsoil and in the less compact substratum.

Barrington silt loam, 0 to 2 percent slopes (443A).—This soil is on outwash plains and occurs mainly in the valley of the Des Plaines River. Included in mapping were small areas of Grays silt loam and of Mundelein silt loam, which is on slightly lower parts of the landscape. Small areas that have a surface layer of loam and a gravelly substratum were also included.

This soil is used mainly as farmland. It has no serious limitations. (Management group I–1)

Barrington silt loam, 2 to 4 percent slopes (443B).—This soil is on outwash plains, mainly in the valley of the Des Plaines River. Included in mapping were small areas of loam and small areas of Grays silt loam, 2 to 4 percent slopes, and of Mundelein silt loam, 0 to 2 percent slopes.

This soil is well suited to the crops commonly grown and can be used for many purposes. Controlling erosion is not a serious problem. (Management group IIe–1)

Barrington and Varna silt loams, 2 to 4 percent slopes (984B).—These soils are in intermorainal areas, generally in the central part of the county. Some areas contain only Barrington silt loam and some only Varna silt loam, but most contain some of each. The Barrington soil is the more common. The Varna soil has a finer textured subsoil and underlying material than the Barrington soil. Included in mapping were small areas of Grays, Markham, Mundelein, Elliott, and Ashkum soils.

The most serious limitation is the moderately slow permeability of the Varna soils. For most uses, slope is not a serious limitation. Erosion is a slight hazard. Most of the acreage is farmed intensively. (Management group IIe–1)

Beach Sand

Beach sand (367) consists of sand and water-rounded stones. It occurs as a strip along the entire shoreline of Lake Michigan. The strip is wide and fairly stable north of Waukegan but is narrow and not stable south of Waukegan and below the bluffs. Formerly, there were no beaches when the level of the lake was high and the bluffs eroded at a rate estimated to be about 5 feet a year. In recent years piers or groins that reach 100 to 300 feet out into the lake have been placed along the shore. They have been very effective in checking bluff erosion, and on the south side of the groins, beach deposits are building up.

Beach sand is not stable enough to support plants. In winter or during a storm, large amounts of sand are reworked and carried southward by shore currents, thus altering even well-defined beaches. Beach sand is suitable only for recreational uses. (Management group VIIIs–1)

Beecher Series

The Beecher series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in thin silty deposits and the underlying calcareous silty clay loam (glacial till). These soils are on uplands in all parts of the county. The native vegetation consisted of grass and hardwood trees.

In a typical profile the plow layer is very dark gray silt loam. In areas not plowed, the uppermost 9 inches of the surface layer is black and the lower 3 inches is dark gray. The 30-inch subsoil consists mainly of firm, silty clay that is dark grayish brown and mottled in the upper part and calcareous and mixed grayish brown and yellowish brown in the lower part. The underlying material is mixed yellowish-brown and grayish-brown, compact, firm, calcareous silty clay loam (glacial till). It contains many pebbles and stones.

Beecher soils are medium acid to slightly acid. They have moderately slow permeability because the subsoil is clayey. The available moisture capacity is high. The water table is usually within 3 feet of the surface in spring.

Typical profile of Beecher silt loam, 0 to 2 percent slopes, 325 feet north of the center of the road and on west side of farm lane, in the SE¼SE¼NW¼ sec. 33, T. 43 N., R. 10 E.

A1—0 to 9 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

A2—9 to 12 inches, dark-gray (10YR 4/1) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

IIB1t—12 to 15 inches, dark grayish-brown (10YR 4/2) silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; firm; medium acid; clear, smooth boundary.

IIB21t—15 to 22 inches, dark grayish-brown (2.5Y 4/2) light silty clay; common, fine, distinct mottles of yellowish brown (10YR 5/6); moderate, fine, prismatic structure breaking to moderate, medium, subangular blocky; coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; firm; strongly acid; clear, smooth boundary.

IIB22t—22 to 33 inches, mixed grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/4) light silty clay; moderate, fine to medium, prismatic structure breaking to moderate, medium, angular blocky; coatings of very dark gray (10YR 3/1) clay on the vertical ped surfaces; firm; slightly acid; gradual, smooth boundary.

IIB3—33 to 42 inches, mixed grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) silty clay loam; weak, fine to medium, prismatic structure breaking to moderate, medium to coarse, angular blocky; patchy coatings of grayish-brown (2.5Y 5/2) clay on the vertical ped surfaces; firm; calcareous; gradual, smooth boundary.

IIC—42 to 60 inches, mixed grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) silty clay loam; massive; firm; calcareous.

The color of the surface layer varies because lighter colored material from the A2 horizon has been mixed with the A1 by plowing or as the result of erosion. The B horizon ranges from 20 to 36 inches in thickness. The depth to compact calcareous glacial till ranges from 30 to 48 inches.

Beecher soils have a lighter colored surface layer in cultivated areas than Elliott soils. Beecher soils have a finer textured subsoil and underlying material than Odell soils. Beecher soils are not so fine textured in the lower subsoil and in the substratum as Frankfort soils.

Beecher silt loam, 0 to 2 percent slopes (298A).—This soil is in areas where there are deposits of glacial till of silty clay loam texture. In some areas in the northern

part of the county, the surface layer is lighter colored than that in the typical profile. Small areas in waterways and at the base of slopes receive deposition from surrounding soils. Included in mapping were small areas of Elliott silt loam and low areas of Ashkum silty clay loam.

Large areas of this soil are farmed intensively; but the many small areas associated with rolling soils are farmed less intensively. The limitations are a seasonal high water table and moderately slow movement of water through the soil. (Management group IIw-1)

Beecher silt loam, 2 to 4 percent slopes (298B).—This soil is in morainal areas. Small areas in waterways and at the base of slopes receive some deposition from the surrounding soils. Included in mapping were small areas of Elliott silt loam, of Markham silt loam, which has a brighter colored subsoil, and of Beecher soils where the subsoil has been mixed into the surface layer as a result of erosion and plowing.

The limitations are a seasonal high water table and moderately slow movement of water through the soil. In some places where this soil is associated with rolling soils, the erosion hazard is a limitation. Some areas are lightly wooded, and some have not been farmed intensively. (Management group IIe-2)

Borrow Area

Borrow area (BA) consists of areas from which soil material has been removed, in some cases only the surface soil, but in others, several feet of soil material. Many have been made deep enough for ponds and are shown on the soil map as ponds.

The soil material is generally low in fertility and in organic-matter content. Calcareous, compact glacial till is exposed in most places. This till supports very little vegetation. To establish vegetation, topdressing or other special management practices are necessary. (Not placed in a management group)

Boyer Series

The Boyer series consists of undulating to rolling, well-drained soils that formed in 2 to 3 feet of sandy material over calcareous sand and gravel. These soils are moderately deep over sand and gravel. They are on uplands in the western and northeastern parts of the county. The native vegetation was hardwood trees.

In a typical profile the plow layer is very dark grayish-brown to grayish-brown sandy loam. Where undisturbed by plowing, the uppermost 3 inches of the surface layer is very dark grayish-brown sandy loam and the lower 6 inches is dark-brown loamy sand. The 23-inch subsoil consists of dark-brown sandy loam in the upper part, of reddish-brown light sandy clay loam in the middle part, and of dark reddish-brown loamy sand in the lower part. The middle part contains many small stones. The underlying material is calcareous sand and gravel. The colors and the stone sizes are variable.

Boyer soils are neutral in reaction and low in fertility. They have moderate permeability in the subsoil and rapid permeability in the underlying material. Available moisture capacity is low. The water table is seldom within 3 feet of the surface. Wind erosion can be a serious hazard in farmed areas.

Typical profile of Boyer sandy loam, 1 to 4 percent slopes, located on idle land, east side of Grass Lake Road, in the SE¼NE¼SE¼ sec. 26, T. 46 N., R. 9 E.

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) light sandy loam; weak, very fine, granular structure; very friable; neutral; abrupt, smooth boundary.

A2—3 to 9 inches, dark-brown (10YR 4/3) loamy sand; weak, fine, granular structure; loose; neutral; clear, smooth boundary.

B1—9 to 13 inches, dark-brown (7.5YR 4/4) sandy loam; weak, fine, subangular blocky structure; very friable; neutral; many small stones; clear, smooth boundary.

B21t—13 to 18 inches, reddish-brown (5YR 4/4) light sandy clay loam; weak, fine or medium, subangular blocky structure; friable; medium acid; many small stones; thin continuous coatings of clay; clear, smooth boundary.

B22t—18 to 24 inches, reddish-brown (5YR 4/4) light sandy clay loam; weak, medium, subangular blocky structure; friable; medium acid; many small stones; thin continuous coatings of clay; clear, smooth boundary.

B3—24 to 32 inches, dark reddish-brown (5YR 3/4) loamy sand; single grain; loose; slightly acid; many stones; thin continuous coatings of clay; abrupt, smooth boundary.

C—32 to 60 inches, pale-brown, yellowish-brown, very dark gray, and light-gray (10YR 6/3, 5/6, 3/1, and 7/1) sand; single grain; loose; calcareous; 15 percent fine stones and 2 percent stones ¼ to ½ inch in diameter.

The A horizon ranges from 7 to 10 inches in thickness. The range in thickness and the variations in color have been caused by erosion. The B horizon ranges from reddish brown to yellowish brown in color and from 12 to 30 inches in thickness. The depth to calcareous sand and gravel ranges from 24 to 40 inches.

Boyer soils have a coarser textured surface layer and subsoil than Fox soils. They are deeper to calcareous sand and gravel than Casco soils.

Boyer sandy loam, 1 to 4 percent slopes (706B).—This undulating soil occurs mainly in the Chain o' Lakes area. Included in mapping were small areas of nearly level to gently sloping Fox loam and Boyer loam, small areas of Boyer sandy loam, 4 to 10 percent slopes, eroded, and some small areas of soils that have a finer textured subsoil and greater depth to calcareous sand.

Most areas are not farmed, partly because of limited available moisture capacity and low fertility and partly because some are surrounded by rolling and steep soils. Farmed areas are more susceptible to wind erosion than to water erosion. (Management group IIs-1)

Boyer sandy loam, 4 to 10 percent slopes, eroded (706C2).—This soil is undulating to rolling. It occurs in the Chain o' Lakes area. Included in mapping were some small areas of eroded Fox loam and Casco loam, small areas of Boyer soils that have a thicker surface layer, and some small areas of soils that have a finer textured subsoil and greater depth to calcareous sand.

Most areas are not farmed, partly because of limited available moisture capacity and low fertility and partly because some are surrounded by steep soils. Farmed areas are more susceptible to wind erosion than to water erosion. (Management group IVe-1)

Casco Series

The Casco series consists of well-drained, undulating to rolling soils that formed in 1 foot to 2 feet of loamy material over calcareous gravel and sand. These soils are on uplands in the northwestern part of the county. The native vegetation was hardwood trees.

In a typical profile, the surface layer is very dark brown to brown loam about 5 inches thick. The subsoil is 14 inches thick. The upper part is dark-brown clay loam. The lower part is gravelly and somewhat sticky and has coatings of dark reddish-brown clay. The underlying material is calcareous gravel and sand. The colors and stone sizes are variable.

These soils are neutral to slightly acid and are low in fertility. They have moderate permeability in the surface layer and subsoil and rapid permeability in the underlying material. The available moisture capacity is low. The water table is seldom within 3 feet of the surface.

Typical profile of Casco loam, 3 to 10 percent slopes, west center back of borrow pit, in the northeast corner of SE¼SE¼SE¼ sec. 4, T. 45 N., R. 9 E.

A1—0 to 3 inches, very dark brown (10YR 2/2) silt loam to loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—3 to 5 inches, brown to dark-brown (7.5YR 4/2) loam; weak, thin, platy structure breaking to weak, fine, granular; friable; neutral; clear, smooth boundary.

B21—5 to 11 inches, dark-brown (7.5YR 4/4) clay loam; weak to moderate, fine, subangular blocky structure; firm; slightly acid; clear, smooth boundary.

B22t—11 to 16 inches, dark-brown (7.5Y 4/4) heavy clay loam; weak to moderate, fine, subangular blocky structure; coatings of brown (7.5Y 4/3) clay on all ped surfaces; firm; medium acid; abrupt, smooth boundary.

IIB3t—16 to 19 inches, brown (7.5Y 4/3) gravelly clay loam; moderate, medium, subangular blocky structure; coatings of dark reddish-brown (5YR 3/3) clay on all ped surfaces; firm; slightly acid; abrupt, smooth boundary.

IIC—19 to 60 inches, brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) gravel; many light brownish-gray (10YR 6/2) stones; structureless; loose; calcareous.

The A horizon ranges from 4 to 8 inches in thickness. The range in thickness and variations in color have been caused by erosion. The A1 horizon contains enough sand to give it a gritty feel. The B horizon ranges from dark brown to reddish brown in color and from 10 to 20 inches in thickness. In places it contains many small stones.

Casco soils are shallower over calcareous gravel than Fox soils. They occur in the same landscape with Rodman soils, which are steeper and shallower to gravel.

Casco loam, 3 to 10 percent slopes, eroded (323C2).—This soil is undulating to rolling. It is in the northwestern part of the county. Included in mapping were small areas of Fox loam and Boyer sandy loam and small areas of darker colored soil and of gravelly soil.

Very little of this soil is farmed, because it has low fertility and limited available moisture capacity and because it is associated with steeper soils. (Management group VIe–1)

Corwin Series

The Corwin series consists of deep, level to gently sloping, well drained to moderately well drained soils that formed in thin silty deposits and the underlying calcareous glacial till of silt loam and loam texture. These soils are on uplands, mainly in the south-central part of the county. The native vegetation was prairie grass.

In a typical profile the surface layer is black to very dark gray silt loam about 11 inches thick. The 31-inch subsoil consists generally of brown to dark yellowish-brown, firm silty clay loam in the upper part and grayer, coarser textured, calcareous soil material in the lower part. The underlying material is grayish-brown, compact, calcareous silt loam (glacial till) mottled with yellowish brown. Pebbles and stones are common in this layer.

These soils are slightly acid to medium acid. They have moderate permeability in the subsoil. Available moisture capacity is high. The water table is generally at least 3 feet below the surface.

Typical profile of Corwin silt loam, 2 to 4 percent slopes, in a meadow, 120 feet south of homesite property line on east side of private lane, in the NW¼NE¼SE¼ sec. 16, T. 43 N., R. 11 E.

A1—0 to 8 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary.

A3—8 to 11 inches, very dark gray (10YR 3/1) silt loam and some black (10YR 2/1) soil material from A1 horizon; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary.

B1t—11 to 14 inches, dark-brown (10YR 4/3) light silty clay loam; moderate, very fine, subangular blocky structure; thin discontinuous coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; firm; medium acid; clear, smooth boundary.

IIB21t—14 to 22 inches, dark yellowish-brown (10YR 4/4) silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; thin continuous coatings of dark-brown clay on all ped surfaces; firm; medium acid; common pebbles and stones; clear, smooth boundary.

IIB22t—22 to 26 inches, light olive-brown (2.5Y 5/4) silty clay loam; few, fine, faint mottles of yellowish-brown (10YR 5/6); weak, fine, prismatic structure to moderate, fine to medium, subangular blocky; thin continuous coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; firm; medium acid; common pebbles and stones; clear, smooth boundary.

IIB3—26 to 42 inches, grayish-brown (2.5Y 5/2) gritty silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine to medium, prismatic structure breaking to weak, medium, subangular blocky; thin discontinuous clay coatings on the horizontal ped surfaces; calcareous; friable; common pebbles and stones; gradual, smooth boundary.

IIC—42 to 60 inches, grayish-brown (2.5Y 5/2) gritty silt loam; compact; common, medium, distinct mottles of yellowish brown (10YR 5/4 and 5/6); weak, medium, subangular blocky structure grading to structureless; friable; common pebbles and stones; calcareous.

The A horizon ranges from black to very dark gray in color and from 10 to 13 inches in thickness. Areas of Corwin soils have small areas where the surface layer contains some sand. The B horizon ranges from 18 to 32 inches in thickness. The IIC horizon ranges from grayish brown to yellowish brown in color and from silt loam to loam in texture.

Corwin soils typically have a slightly darker colored surface layer than Montmorenci soils. They are somewhat less permeable than Barrington soils, and the lower part of the subsoil and the substratum are slightly finer textured and more compact.

Corwin silt loam, 0 to 2 percent slopes (495A).—This soil is in intermorainal areas, mainly in the south-central part of the county. Included in mapping were small areas of Montmorenci silt loam and small areas of Odell silt loam, which is on slightly lower parts of the landscape. Small areas of loam were also included.

This soil is well suited to the crops commonly grown and is farmed intensively. There are no serious limitations for farming or other uses. (Management group I–1)

Corwin silt loam, 2 to 4 percent slopes (495B).—This soil is in intermorainal areas, mainly in the south-central part of the county. Included in mapping were small areas of Montmorenci silt loam and of Odell silt loam, which is on slightly lower parts of the landscape. Small areas of loam were also included.

This soil is suited to the crops commonly grown. The only limitation for most uses is the slope. Because the slopes are short, controlling erosion is not a serious problem, except where farming is intensive. (Management group IIe–1)

Del Rey Series

The Del Rey series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in moderately fine textured, calcareous sediments deposited in glacial lakes. These soils are on uplands and occur in many parts of the county. The native vegetation was hardwood trees.

In a typical profile the plow layer is dark-gray silt loam. Where undisturbed by plowing, the upper 3 inches of the surface layer is very dark gray and the lower 6 inches is light brownish gray. The 32-inch subsoil is grayish-brown to light brownish-gray, firm silty clay loam in the upper part, grayish-brown and mixed light brownish-gray and yellowish-brown, firm silty clay in the middle part, and gray and yellowish-brown, calcareous, firm silty clay loam in the lower part. The upper part is mottled with yellowish brown. The underlying material consists of mixed gray and yellowish-brown, calcareous silty clay loam and silt loam, and thin sandy layers.

These soils are medium acid to strongly acid. They have moderately slow permeability and high available moisture capacity. The water table is generally within 3 feet of the surface in spring.

Typical profile of Del Rey silt loam, 0 to 2 percent slopes, in a timbered area, 90 feet north of highway center and 71 feet east of fence line, in the southwestern corner of SE¼SW¼SE¼ sec. 13, T. 43 N., R. 10 E.

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; weak to moderate, fine, granular or crumb structure; friable; strongly acid; abrupt, smooth boundary.

A21—3 to 6 inches, light brownish-gray (2.5Y 6/2) silt loam; weak, thin, platy structure breaking to weak, fine, granular; friable; strongly acid; clear, smooth boundary.

A22—6 to 9 inches, light brownish-gray (10YR 6/2) silt loam; medium, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B1—9 to 11 inches, mixed light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/4) light silty clay loam; weak to moderate, very fine, subangular blocky structure; firm; strongly acid; clear, smooth boundary.

B21t—11 to 17 inches, light brownish-gray (10YR 6/2) silty clay loam; medium, fine, distinct mottles of yellowish brown (10YR 5/6 and 5/4); continuous coatings of grayish-brown (10YR 5/2) to brown (10YR 4/3) clay on all ped surfaces; moderate, fine, subangular blocky structure; firm; strongly acid; clear, smooth boundary.

B22t—17 to 24 inches, grayish-brown (10YR 5/2) light silty clay; medium, fine, distinct mottles of yellowish brown (10YR 5/6); continuous coatings of dark grayish-brown (10YR 4/2 to 3/2) clay on all ped surfaces; weak, medium, prismatic structure breaking to moderate, fine to medium, subangular blocky; firm; medium acid; clear, smooth boundary.

B23t—24 to 30 inches, mixed light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/6) light silty clay; continuous coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; weak, medium, prismatic structure breaking to moderate, medium, angular blocky; firm; neutral; clear, smooth boundary.

B3—30 to 41 inches, mixed gray (5Y 5/1) and yellowish-brown (10YR 5/6) light silty clay loam; continuous coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; weak, coarse, prismatic structure breaking to weak, fine or medium, angular blocky; firm; calcareous; clear, smooth boundary.

C—41 to 60 inches, mixed gray (5Y 5/1) and yellowish-brown (10YR 5/6) heavy silt loam to light silty clay loam; patchy coatings of gray (5Y 6/1) clay on the vertical ped surfaces; weak, coarse, prismatic structure breaking to weak or moderate, medium, platy; calcareous.

The plow layer has variations in color caused by plowing lighter colored material from the A2 horizon into it or by adding organic matter to it. The B horizon ranges from 20 to 32 inches in thickness. In places the colors are brighter than those in the typical profile. The thickness of the calcareous sediments ranges from 3½ feet to many feet.

Del Rey soils have a lighter colored surface layer than Martinton soils. They are less permeable than Aptakisic soils because they are finer textured in the lower part of the subsoil and in the substratum.

Del Rey silt loam, 0 to 2 percent slopes (192A).—This soil is in intermorainal areas once occupied by glacial lakes. Included in mapping were small areas of Saylesville silt loam, 1 to 4 percent slopes, which has a brighter colored subsoil, and small areas of Aptakisic soils and Nappanee soils. Also included were small areas that have gentle slopes and areas where the lakebed sediments are less than 3½ feet thick.

This soil is good for cropland, and most of it is cultivated. There are also large areas of woodland and unimproved pasture. The most serious limitations are a seasonal high water table and moderately slow movement of water through the soil. (Management group IIw–1)

Del Rey silt loam, 2 to 4 percent slopes (192B).—This soil is in intermorainal areas once occupied by glacial lakes. Included in mapping were small areas of Saylesville silt loam, 1 to 4 percent slopes, which has a brighter colored subsoil, and Aptakisic soils, which are more permeable. Also included were small areas in which the deposit of lakebed sediments is less than 3½ feet thick.

This soil is good for cropland, and most of it is cultivated. There are also large areas of woodland and unimproved pasture. The most serious limitations are a seasonal high water table and moderately slow movement of water through the soil. Slope is not a serious limitation for most uses. (Management group IIe–2)

Dresden Series

The Dresden series consists of level to gently sloping, well drained to moderately well drained soils that formed in 2 to 3 feet of loamy material over calcareous gravelly material. These soils are on terraces, mainly in the valley of the Des Plaines River. The native vegetation consisted of grass and trees.

In a typical profile the plow layer is very dark grayish-brown loam about 8 inches thick. Below this is 3 inches of dark grayish-brown loam. The 18-inch subsoil consists mainly of dark-brown, gravelly clay loam in the upper part and of dark reddish-brown, sticky, gravelly clay loam in the lower part. The underlying material consists of calcareous sand and gravel and some silt. The colors and stone sizes are variable.

These soils are medium acid to slightly acid. They have moderate permeability in the surface layer and subsoil and rapid permeability in the substratum. The available moisture capacity is moderate. The water table is generally at least 3 feet below the surface.

Typical profile of Dresden loam, 0 to 2 percent slopes, in a field, 150 feet south of the highway center and 15 feet east of fence, in the northeast corner of NE¼SW¼SW¼ sec. 14, T. 43 N., R. 11 E.

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; very friable; slightly acid; abrupt, smooth boundary.

A2—8 to 11 inches, dark grayish-brown (10YR 4/2) loam; weak, fine, granular structure; very friable; medium acid; clear, smooth boundary.

B1t—11 to 15 inches, dark-brown (7.5YR 4/3) sandy clay loam; weak to moderate, fine, subangular blocky structure; firm; medium acid; clear, smooth boundary.

B2t—15 to 26 inches, dark-brown (7.5YR 4/4) gravelly clay loam; weak to moderate, fine, subangular blocky structure; continuous coatings of dark-brown (7.5YR 4/3) clay on all ped surfaces; firm; medium acid; abrupt, smooth boundary.

B3t—26 to 29 inches, dark reddish-brown (5YR 3/4) gravelly clay loam; moderate, medium, subangular blocky structure; continuous coatings of dark reddish-brown (5YR 3/3) clay; firm, slightly acid; abrupt, wavy boundary.

IIC—29 to 60 inches, mixed light brownish-gray (10YR 6/2), yellowish-brown (10YR 5/4), and brown (10YR 4/3) loamy gravel; structureless; loose; calcareous.

The A horizon ranges from 8 to 11 inches in thickness. The range in thickness and variations in color have been caused by erosion. The Ap horizon ranges from very dark grayish brown to very dark gray in color, and the A2 horizon from grayish brown to dark grayish brown. The B horizon ranges from 15 to 28 inches in thickness. In places it contains many stones. The depth to calcareous gravel ranges from 24 to 40 inches.

Dresden soils have a darker colored surface layer than Fox soils. Typically, the B2t horizon is gravelly in Dresden and nongravelly in Casco soils. Dresden soils are coarser textured throughout the profile than Grays soils, and they have more gravel in the underlying material.

Dresden loam, 0 to 2 percent slopes (325A).—This soil occurs generally on terraces in the valley of the Des Plaines River. Included in mapping were small areas of a darker colored soil and small areas of a soil that occurs in slightly lower parts of the landscape and has a higher water table. Also included were small areas of Fox loam, 0 to 2 percent slopes, and Grays silt loam, 0 to 2 percent slopes.

The most serious limitation is the moderate available moisture capacity. Many areas are not farmed regularly, because they occur within larger areas of soils that are frequently flooded. (Management group IIs–1)

Dresden loam, 2 to 4 percent slopes (325B).—This soil is generally on terraces in the valley of the Des Plaines River. Included in mapping were small areas of Fox loam, 2 to 4 percent slopes, and small areas of a similar but darker colored soil. Also included were small areas of a soil that occurs in slightly lower parts of the landscape and has a higher water table; of Grays silt loam, 2 to 4 percent slopes; and of Dresden loam, 0 to 2 percent slopes.

Wind erosion is a more serious hazard than water erosion. The most serious limitation is the moderate available moisture capacity. Many areas are not farmed regularly, because they are next to gravel pits or are surrounded by soils that are frequently flooded. (Management group IIe–4)

Elliott Series

The Elliott series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in thin silty deposits and the underlying calcareous glacial till of silty clay loam texture. These soils are on uplands in morainal areas, chiefly in the central and northern parts of the county. The native vegetation was prairie grass.

In a typical profile the surface layer is black to very dark brown silt loam about 14 inches thick. The 26-inch subsoil consists of 5 inches of dark grayish-brown, mottled, very firm silty clay loam, 13 inches of brown, mottled, very firm silty clay, and 8 inches of mixed gray and yellowish-brown, firm silty clay loam. The underlying material consists of mixed yellowish-brown, light olive-brown, and gray, compact, firm, calcareous silty clay loam (glacial till).

These soils are medium acid. They have moderately slow permeability because the subsoil is somewhat clayey. The available moisture capacity is high. The water table is generally within 3 feet of the surface in spring.

Typical profile of Elliott silt loam, 0 to 2 percent slopes, in a cropped field, on a slightly elevated site 260 feet south of section line, in the northwest corner of NE¼NE¼NW¼ sec. 18, T. 44 N., R. 11 E.

Ap—0 to 9 inches, black (10YR 2/1) silt loam; moderate, very fine to fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A3—9 to 14 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary.

IIB21t—14 to 19 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, fine, faint mottles of yellowish brown (10YR 5/4); moderate, very fine, subangular blocky structure; continuous coatings of dark-gray (10YR 4/1) clay on all ped surfaces; very firm; medium acid; gradual, smooth boundary.

IIB22t—19 to 25 inches, brown (10YR 4/3) light silty clay; common, fine, distinct mottles of gray (10YR 5/1) and yellowish brown (10YR 5/4 and 5/6); moderate, fine to very fine, subangular blocky structure; continuous coatings of dark grayish-brown (10YR 4/2) clay on all ped surfaces; very firm; slightly acid; clear, smooth boundary.

IIB23t—25 to 32 inches, brown (10YR 4/3) silty clay; common, fine, distinct mottles of yellowish brown (10YR 5/4), gray (10YR 5/1), and olive gray (5Y 5/2); moderate, medium, prismatic structure breaking to strong, fine, subangular blocky; continuous coatings of very dark gray (10YR 3/1) clay on all ped surfaces; very firm; slightly acid; clear, smooth boundary.

IIB3—32 to 40 inches, mixed gray (5Y 5/1) and yellowish-brown (10YR 5/6) silty clay loam; moderate, medium, prismatic structure breaking to moderate,

medium, angular blocky; continuous coatings of black to very dark gray (10YR 2/1 to 3/1) clay on vertical ped surfaces; firm; calcareous; gradual, smooth boundary.

IIC—40 to 60 inches, mixed gray (5Y 5/1), light olive-brown (2.5Y 5/6), and yellowish-brown (10YR 5/6) silty clay loam; compact; moderate, medium, prismatic structure to massive; continuous coatings of dark-gray clay on vertical ped surfaces; calcareous.

The A horizon ranges from 13 to 15 inches in thickness. It has a color range that is the result of erosion. The B horizon ranges from 20 to 36 inches in thickness. The depth to the compact, calcareous glacial till (II C horizon) ranges from 30 to 48 inches. In places the IIC horizon contains many pebbles and stones.

Elliott soils have a darker colored surface layer than cultivated Beecher soils. They have a finer textured subsoil and underlying material than Odell soils. Elliott soils are darker colored and are coarser textured throughout the profile than Frankfort soils.

Elliott silt loam, 0 to 2 percent slopes (146A).—This soil is in glacial till of silty clay loam texture. Included in mapping were small areas of Beecher silt loam, 0 to 2 percent slopes, and low areas of Ashkum silty clay loam. Also included were small areas of Mundelein silt loam.

This soil is good for crops. It is farmed intensively, except where it is associated with rolling soils. The limitations are a seasonal high water table and moderately slow movement of water through the soil. (Management group IIw–1)

Elliott silt loam, 2 to 4 percent slopes (146B).—This soil is in areas of glacial moraines. Included in mapping were small areas of Beecher silt loam, 2 to 4 percent slopes, and areas of Mundelein silt loam. Also included were areas of eroded Elliott soils where plowing has mixed part of the subsoil into the plow layer, and small areas in waterways and at the base of slopes that receive some deposition from the soils around them.

This soil is good for crops. It is farmed intensively, except where it is associated with rolling soils. The limitations are a seasonal high water table and moderately slow movement of water through the soil. Slope can be a serious limitation if the soil is intensively farmed, but it is not a serious limitation for most uses. (Management group IIe–2)

Fox Series

The Fox series consists of level to rolling, well drained to moderately well drained soils that formed in 2 to 3 feet of loamy material over calcareous gravelly and sandy material. These soils are mainly in the western part of the county. The native vegetation was hardwood trees.

In a typical profile the plow layer is very dark grayish-brown to grayish-brown loam. In unplowed areas, the uppermost 3 inches is very dark grayish brown and the lower 5 or 6 inches is dark grayish brown. The 20-inch subsoil consists of 5 inches of brown, friable sandy clay loam, 6 inches of brown, firm clay loam, and 9 inches of dark reddish-brown, sticky sandy clay loam. The underlying material is calcareous loamy gravel that varies in color.

These soils are medium acid to slightly acid. They have moderate permeability in the surface layer and subsoil and rapid permeability in the substratum. The available moisture capacity is moderate. The water table is generally at least 3 feet below the surface.

Typical profile of Fox loam, 2 to 4 percent slopes, on east bank of gravel pit, in the northwest corner of the NW¼NE¼NW¼ sec. 33, T. 46 N., R. 9 E.

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) loam; moderate, very fine, granular structure; very friable; slightly acid; abrupt, smooth boundary.

A2—3 to 8 inches, dark grayish-brown (10YR 4/2) loam; weak, thin, platy structure breaking to weak, fine, granular; very friable; medium acid; clear, smooth boundary.

B1t—8 to 13 inches, brown (7.5YR 4/4) sandy clay loam; weak to moderate, fine, subangular blocky structure; friable; strongly acid; clear, smooth boundary.

B2t—13 to 19 inches, brown (7.5YR 4/4) clay loam; moderate, fine, subangular blocky structure; coatings of clay on all ped surfaces; firm; strongly acid; clear, smooth boundary.

IIB3t—19 to 28 inches, dark reddish-brown (5YR 3/4) sandy clay loam; moderate, fine, subangular blocky structure; coatings of clay on all ped surfaces; firm; medium acid; clear, wavy boundary.

IIC1—28 to 35 inches, brown (7.5YR 4/4) loamy gravel; structureless; loose; calcareous; gradual, wavy boundary.

IIC2—35 to 60 inches, mixed yellowish-brown (10YR 5/4 or 5/8), light yellowish-brown (10YR 6/4), and very dark gray (10YR 3/1) loamy gravel; structureless; calcareous; cobblestones 8 to 10 inches in diameter are common.

The A horizon ranges from 7 to 10 inches in thickness. The thickness and color of this horizon vary because of the effects of erosion. The B horizon ranges from 15 to 28 inches in thickness. In places it contains many pebbles. The depth to calcareous gravel ranges from 24 to 40 inches.

Fox soils have a lighter colored surface layer than Dresden soils. They are deeper over gravel than Casco soils.

Fox loam, 0 to 2 percent slopes (327A).—This soil is associated with rolling to steep soils in the western part of the county. Included in mapping were small areas of Boyer soil and Casco soil and small areas of Dresden loam, 0 to 2 percent slopes.

The most serious limitations are inadequate available moisture capacity and low fertility. Water erosion is not a hazard. Many areas are not farmed, because they are associated with rolling to steep soils. (Management group IIs–1)

Fox loam, 2 to 4 percent slopes (327B).—This soil is associated with rolling to steep soils in the western part of the county. Included in mapping were small areas of Boyer soils, Casco soils, and Dresden loam, 2 to 4 percent slopes.

This soil is not intensively farmed, and large areas are still woodland. The most serious limitations are inadequate available moisture capacity, low fertility, and association with rolling to steep soils. (Management group IIe–4)

Fox loam, 4 to 7 percent slopes, eroded (327C2).—This soil is undulating to gently rolling, and generally it is in the western part of the county. Included in mapping were small areas of Casco loam, 3 to 10 percent slopes, eroded, and slightly eroded areas of Fox loam. Also included were small areas of Dresden loam, 2 to 4 percent slopes.

Many areas are idle or are used as unimproved pasture. Both water erosion and wind erosion are hazards in farmed areas. Some areas are not farmed, because they are closely associated with rolling to steep soils. The most

serious limitations are inadequate available moisture capacity and irregular topography. (Management group IVe–1)

Fox loam, 7 to 12 percent slopes, eroded (327D2).—This soil is rolling, and it is in the western part of the county. Included in mapping were significant areas of eroded Casco loam and small areas of uneroded Fox soils and Casco soils.

This soil is cropped in only a few areas and mainly is idle or is in woodland or in unimproved pasture. There are some homesites, mostly near the lakes. (Management group IVe–1)

Frankfort Series

The Frankfort series consists of level to gently sloping, somewhat poorly drained soils that formed in thin silty deposits and the underlying calcareous glacial drift of silty clay texture. These soils are on uplands and occur mainly in the eastern part of the county. The native vegetation consisted of grass and hardwood trees.

In a typical profile the plow layer is very dark brown to dark grayish-brown silt loam. Where undisturbed by plowing, the uppermost 6 inches of the surface layer is very dark brown to almost black and the lower 3 inches is dark gray. The 24-inch subsoil consists mainly of grayish-brown, firm silty clay in the uppermost part and calcareous silty clay that has more yellowish-brown color in the lower part. The underlying material consists of mixed brown, gray, and greenish-gray, compact, firm, calcareous silty clay (glacial till) mottled with yellowish brown.

These soils are slightly acid to mildly alkaline. They have slow permeability because the subsoil and underlying material are clayey. The available moisture capacity is not always adequate, because of the large amounts of clay in the soil. The water table is generally within 3 feet of the surface in spring. Runoff is rapid and erosion a serious hazard in gently sloping areas.

Typical profile of Frankfort silt loam, 0 to 2 percent slopes, 89 feet north of fireplug and 42 feet east of road center, in the SE¼SW¼SW¼ sec. 32, T. 44 N., R. 12 E.

A1—0 to 6 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; mildly alkaline; clear, smooth boundary.

A2—6 to 9 inches, dark-gray (10YR 4/1) silt loam; weak, medium to thick, platy structure breaking to moderate, fine, granular; friable; slightly acid; abrupt, smooth boundary.

IIB1t—9 to 11 inches, dark grayish-brown (10YR 4/2) silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/4 and 5/6); moderate, fine, subangular blocky structure; coatings of dark-gray (10YR 4/1) clay on all ped surfaces; firm; medium acid; clear, smooth boundary.

IIB21t—11 to 19 inches, grayish-brown (10YR 5/2) silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine to medium, prismatic structure breaking to moderate, fine to medium, subangular blocky; coatings of dark-gray (10YR 4/1) and dark grayish-brown (10YR 4/2) clay on all ped surfaces; firm; slightly acid; clear, smooth boundary.

IIB22t—19 to 25 inches, grayish-brown (2.5Y 5/2) silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/4 and 5/6) and brown (10YR 4/3); weak, medium, prismatic structure breaking to moderate, medium, subangular blocky; coatings of grayish-brown (10YR 5/2) clay on all ped surfaces; firm; mildly alkaline; abrupt, smooth boundary.

IIB3—25 to 33 inches, dark-gray (5Y 4/1) silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/4 and 5/6); weak, medium, prismatic structure breaking to moderate, medium, angular blocky; continuous coatings of grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2) clay on horizontal ped surfaces; firm; calcareous; clear, smooth boundary.

IIC1—33 to 47 inches, brown (10YR 5/3) silty clay; common, medium, faint mottles of dark yellowish brown (10YR 4/4) and few, fine, distinct mottles of greenish-gray (5GY 6/1); weak, coarse, prismatic structure grading to massive; coatings of greenish-gray (5GY 6/1) clay on vertical ped surfaces and in fine cracks; firm; calcareous; gradual, wavy boundary.

IIC2—47 to 60 inches, mixed brown (10YR 5/3), gray (5Y 5/1), and greenish-gray (5GY 6/1) silty clay; massive; compact; calcareous.

The range in color and thickness of the A horizon is the result of slope and of erosion. The B horizon ranges from 15 to 30 inches in thickness.

Frankfort soils are darker colored than Nappanee soils. They have a finer textured lower subsoil and substratum than Beecher soils. Frankfort soils have a lighter colored, coarser textured surface layer than Montgomery soils.

Frankfort silt loam, 0 to 2 percent slopes (320A).—This soil generally occurs on broad flats east of the Des Plaines River and in the southern part of the county. Included in mapping were small areas of Nappanee silt loam, 0 to 2 percent slopes, and low areas of Montgomery silty clay. Also included were small areas of Wauconda soils.

Most large areas of this soil are near urban areas where farming is no longer a major consideration. The most serious limitations are a seasonal high water table and slow movement of water through the soil. (Management group IIIw–1)

Frankfort silt loam, 2 to 4 percent slopes (320B).—This soil occurs throughout the county but mostly east of the Des Plaines River. Included in mapping were small areas of Nappanee silt loam, 2 to 4 percent slopes, which is lighter colored. Also included were small eroded spots and small areas of Wauconda soils.

Most large areas of this soil are near urban areas, where farming is no longer a major consideration. These areas are suitable for subdivisions and industrial sites, and they are in demand for these purposes. The most serious limitations are a seasonal high water table and slow movement of water through the soil. Erosion is a serious hazard if cropping is intensive. (Management group IIIe–2)

Granby Series

The Granby series consists of level, poorly drained soils that formed in sandy beach deposits. These soils are in the dune and marsh area adjacent to Lake Michigan, and they occur almost entirely north of Waukegan. The native vegetation was swamp grass.

In a typical profile the surface layer is black loamy fine sand about 10 inches thick. The subsoil is light brownish-gray sand or loamy sand about 8 inches thick. The underlying material, in most places, is mixed light brownish-gray, yellowish-brown, and light-gray calcareous sand. In the sand is a layer of rounded stones.

These soils are neutral in reaction and low in fertility. The height of the water table varies with the level of the water in Lake Michigan, but in most areas the water table is within 3 feet of the surface throughout the year.

Typical profile of Granby loamy fine sand, 65 feet south of road and 40 feet east of a sand ridge, in the northwest corner of NW¼NW¼SW¼ sec. 14, T. 46 N., R. 12 E.

A—0 to 10 inches, black (10YR 2/1) loamy fine sand; high organic-matter content; friable to loose; neutral; abrupt, smooth boundary.

Bg—10 to 18 inches, light brownish-gray (10YR 6/2) sand; many, fine, distinct mottles; some black (10YR 2/1) organic stainings; single grain; neutral; loose; clear, smooth boundary.

Cg—18 to 60 inches, light brownish-gray (10YR 6/2) sand, and yellowish-brown (10YR 5/6) and light-gray (10YR 7/1) sand grains; single grain; loose; calcareous; layer of rounded stones at a depth of 25 inches.

The color of the A horizon varies because of the organic-matter content; the areas bordering Marsh are generally darker colored. The B horizon ranges from 8 to 15 inches in thickness.

Granby soils do not resemble any other soils in the county. They are transitional between Plainfield sand, slightly acid variant, and Marsh.

Granby loamy fine sand (513).—This soil occupies level areas and slight rises in the marshlands along Lake Michigan. Included in mapping were spots of Marsh and small high spots that have a lighter colored surface layer and a brighter colored subsoil.

Most areas of this soil are in Illinois Beach State Park. None has been used for urban development. The most serious limitation is a continuously high water table. (Management group IIIw–2)

Gravel Pits

Gravel pits (GP) consist of areas where sand and gravel have been excavated or mined. Most gravel pits are in the valley of the Des Plaines River and in areas of the northwestern part of the county where Boyer, Casco, Dresden, Fox, and Rodman soils occur. There are several large commercial mining enterprises, and many, small, privately owned pits from which sand or gravel is removed only occasionally or not at all. Some of the small pits are permanently filled with water and are used as fishponds and for recreational purposes. (Not placed in a management group)

Grays Series

The Grays series consists of deep, level to gently sloping, well drained to moderately well drained soils that formed in 2 to 3 feet of silty material and the underlying calcareous, stratified silt and sand. These soils are on uplands in all parts of the county. The native vegetation consisted of prairie grass and hardwood trees.

In a typical profile the plow layer is very dark gray silt loam about 8 inches thick. The subsurface layer is grayish-brown silt loam about 3 inches thick. The subsoil consists of 13 inches of brown, firm silty clay loam and 16 inches of mixed yellowish-brown and grayish-brown, calcareous, friable silt loam. The underlying material consists of yellowish-brown and grayish-brown, calcareous, stratified silt loam and very fine sandy loam.

These soils are slightly acid to medium acid. They have moderate permeability and high available moisture capacity. The water table is generally at least 3 feet below the surface.

Typical profile of Grays silt loam, 2 to 4 percent slopes, 15 feet west of fence, 15 feet east of a line running north and south through utility pole, and 130 feet south of road center, in the SW¼SE¼NE¼ sec. 30, T. 45 N., R. 10 E.

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—8 to 11 inches, grayish-brown (10YR 5/2) silt loam; some very dark gray (10YR 3/1) material from Ap horizon; moderate, fine, granular structure; friable; medium acid; clear, smooth boundary.

B1t—11 to 16 inches, brown (7.5YR 5/4) light silty clay loam; moderate, fine, subangular blocky structure; continuous coatings of dark-gray (10YR 4/1) clay, and discontinuous coatings of light-gray (10YR 7/1) silt; firm; medium acid; clear, smooth boundary.

B2t—16 to 24 inches, brown (10YR 5/3) silty clay loam; few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; continuous coatings of dark grayish-brown (10YR 4/2) clay; firm; medium acid; clear, smooth boundary.

IIB3—24 to 40 inches, mixed yellowish-brown (10YR 5/6 and 5/8) and grayish-brown (10YR 5/2) silt loam; weak, medium, prismatic structure breaking to moderate, medium, angular blocky; discontinuous coatings of dark grayish-brown (10YR 4/2) clay on vertical ped surfaces; friable; calcareous; gradual, smooth boundary.

IIC—40 to 60 inches, mixed yellowish-brown (10YR 5/6 and 5/8) and grayish-brown (10YR 5/2), stratified silt loam and very fine sandy loam; weak, medium, prismatic structure to massive; friable; calcareous.

The A horizon ranges from black to dark brown in color, depending upon the slope and the degree of erosion, and from 10 to 13 inches in thickness. Small areas have some sand in the surface layer. The B horizon ranges from 18 to 30 inches in thickness.

Grays soils have a lighter colored surface layer when cultivated than Barrington soils and a darker colored surface layer than Zurich soils. They have coarser textured, more permeable, less compact underlying material than Montmorenci soils.

Grays silt loam, 0 to 2 percent slopes (698A).—This soil is on outwash plains and in intermorainal areas in all parts of the county. Included in mapping were small areas of Barrington silt loam, 0 to 2 percent slopes, and Zurich soils. Also included were small areas of Mundelein silt loam, which occurs in slightly lower parts of the landscape, and small areas that have a surface layer of loam and a gravelly substratum.

This soil is well suited to the crops commonly grown. The large areas are used chiefly as farmland. There are no serious limitations for farming and many other uses. (Management group I–1)

Grays silt loam, 2 to 4 percent slopes (698B).—This soil is on outwash plains in all parts of the county. Included in mapping were small areas of Barrington silt loam, 2 to 4 percent slopes, and of Zurich silt loam, 2 to 4 percent slopes. Also included were small low areas of Wauconda silt loam and areas that have a surface layer of loam and a gravelly substratum.

This soil is well suited to crops and is suitable for many other uses. The main limitation is the hazard of erosion. (Management group IIe-1)

Grays and Markham silt loams, 0 to 2 percent slopes (979A).—These soils are in intermorainal areas in all parts of the county. Some areas contain only Grays silt loam and some only Markham silt loam, but most contain some of each. The Grays soil is the more common. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Grays soil and underlying material of silty clay loam like that of the Markham soil. Also included were small areas of Barrington and Varna silt loams and Zurich and Morley silt loams, all of which are moderately well drained to well drained, and small areas of Wauconda and Beecher silt loams, which are somewhat poorly drained.

These soils are well suited to the crops commonly grown. The only limitation for uses other than crops is the moderately slow permeability of the Markham soil. (Management group I-1)

Grays and Markham silt loams, 2 to 4 percent slopes (979B).—These soils are in intermorainal areas in all parts of the county. Some areas contain only Grays silt loam and some only Markham silt loam, but most contain some of each. The Grays soil is the more common. The Markham soil has a finer textured subsoil and underlying material than the Grays soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Grays soil and underlying material like that of the Markham soil. Also included in mapping were small areas of Barrington and Varna silt loams, 2 to 4 percent slopes, and Zurich and Morley silt loams, 2 to 4 percent slopes, all of which are moderately well drained to well drained, and small areas of Wauconda and Beecher silt loams, which are somewhat poorly drained.

The most serious limitation is the moderately slow permeability of the Markham soil. Slope is not a serious limitation for most uses. Erosion is a slight hazard. Much of the acreage is farmed intensively. (Management group IIe-1)

Harpster Series

The Harpster series consists of deep, level to depressional, poorly drained to very poorly drained soils that formed in thick, silty and clayey, water-deposited materials. These soils are in low areas in all parts of the county. In many places fresh-water snail shells or shell fragments give the surface a grayish cast. The native vegetation was swamp grass.

In a typical profile the surface layer is black, calcareous silty clay loam about 15 inches thick. The 26-inch subsoil is gray, mottled, firm, calcareous silty clay loam. The underlying material is mixed gray and yellowish-brown, calcareous silty clay loam.

These soils have moderate permeability in the clayey subsoil. They have high available moisture capacity. The water table is at or near the surface in spring but varies between 1 foot and 4 feet below the surface the rest of the year, depending upon artificial drainage. The organic-matter content is high.

Typical profile of Harpster silty clay loam, in a cropped field, 140 feet west and 35 feet north of corner post, in the southwest corner of the SE¼SE¼SE¼ sec. 3, T. 46 N., R. 9 E.

Ap—0 to 9 inches, black (10YR 2/1) silty clay loam; moderate, fine to medium, granular structure; friable; calcareous; common snail shells and many broken ones; abrupt, smooth boundary.

A3—9 to 15 inches, black (10YR 2/1) silty clay loam; moderate, very fine, subangular blocky structure; firm; calcareous; many shell fragments; clear, smooth boundary.

B2g—15 to 19 inches, gray (5Y 5/1) light silty clay; few, fine, faint mottles of light olive brown (2.5Y 5/4); continuous coatings of clay on all ped surfaces; weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; firm; calcareous; shell fragments; clear, wavy boundary.

B31g—19 to 27 inches, gray (5Y 6/1) silty clay loam; many, medium, prominent mottles of yellowish brown (10YR 5/6); weak, medium, prismatic structure breaking to moderate, fine to medium, subangular blocky; firm; calcareous; clear, smooth boundary.

B32g—27 to 41 inches, gray (5Y 5/1) light silty clay loam; many, medium, prominent mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic structure breaking to weak, medium, subangular blocky; firm; calcareous; gradual, wavy boundary.

C—41 to 60 inches, mixed gray (5Y 6/1) and yellowish-brown (10YR 5/6 and 5/4) silty clay loam; compact; structureless; calcareous.

The A horizon ranges from heavy silty clay loam to silt loam or loam in texture. The number of snail shells incorporated in the A horizon varies considerably from place to place. In some places the concentration of shells whitens the soil, but in other places there are only a few broken shells. The B horizon ranges from 20 to 30 inches in thickness and from gray to grayish brown in color. In places the C horizon is stratified loamy and clayey material.

Harpster soils are similar to Peotone, Pella, and Ashkum soils, but the Harpster soils are calcareous throughout.

Harpster silty clay loam (67).—This soil is level to depressional. It is subject to ponding, unless some drainage has been provided. Many areas in the northwestern part of the county have a surface layer of silt loam to loam. Some areas at the base of a waterway or the base of a slope have received several inches of soil material recently. Included in mapping were small areas of Peotone silty clay loam, Pella silty clay loam, and Ashkum silty clay loam. Also included were small areas of Houghton muck.

Nearly all the acreage is cultivated. Wetness is the main limitation. For urban development, the limitation is serious. (Management group IIw-2)

Hennepin Series

The Hennepin series consists of steep to very steep, well-drained soils. These soils developed in calcareous glacial material of silty, loamy, or sandy texture. They are on uplands in the eastern and northern parts of the county. The native vegetation was hardwood forest.

In a typical profile the surface layer is dark-gray silt loam or loam about 4 inches thick. The subsoil is yellowish-brown heavy silt loam about 10 inches thick. The underlying material is calcareous silt loam that is yellowish brown in the upper part and light yellowish brown below a depth of about 23 inches.

These soils are neutral to moderately alkaline in reaction and variable in fertility. Surface runoff is rapid. Permeability and the available moisture capacity are moderate. The water table is always below a depth of 3 feet.

Typical profile of Hennepin loam, 30 to 60 percent slopes, in a wooded area, in the middle of a very steep slope and 20 feet west of poplar tree, in the southeast corner of NW¼NE¼ sec. 14, T. 43 N., R. 9 E.

A—0 to 4 inches, dark-gray (10YR 4/1) loam; moderate, medium, granular structure; friable; moderately alkaline; clear, smooth boundary.

B—4 to 14 inches, yellowish-brown (10YR 5/4) heavy silt loam; moderate, very fine, subangular blocky structure; discontinuous coatings of dark grayish-brown (10YR 4/2) clay on all surfaces of peds; firm; calcareous; gradual, smooth boundary.

C1—14 to 23 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; firm; calcareous; gradual, smooth boundary.

C2—23 to 60 inches, light yellowish-brown (10YR 6/4) silt loam; weak, medium, prismatic structure breaking to weak, fine, angular blocky; firm; calcareous.

The A horizon ranges from silt loam to loam in texture. It varies in color and thickness as a result of erosion. In places there is no evidence of a B horizon. The depth to calcareous material ranges from 4 to 15 inches. The underlying material ranges from silt loam to sandy loam in texture.

Hennepin soils have a thinner surface layer than Miami and Zurich soils, and in places they lack a B horizon. They lack the content of gravel that is characteristic of Rodman soils.

Hennepin loam, 15 to 30 percent slopes (25F).—This soil occurs in many parts of the county. Included in some of the areas mapped are small areas of Miami silt loam and of Zurich silt loam. Also included were areas of eroded Miami, Zurich, and Hennepin soils.

This soil is too steep for most uses other than forestry, recreation, and wildlife habitat. It is used mainly as woodland or unimproved pasture. Some areas that are within urban areas are used as parks. (Management group VIe–1)

Hennepin loam, 30 to 60 percent slopes (25G).—This soil occurs south of Waukegan, mainly on the bluffs along Lake Michigan and in steep ravines that extend back into the uplands. Included in mapping were areas of soils that are thinner than soils of the Hennepin series, mainly because of the wave action that erodes the bluffs along Lake Michigan.

This soil is too steep for most uses other than forestry, recreation, and wildlife habitat. Most of it is wooded or has recently been planted to shrubs and trees. Most areas are in urban sections, where control of erosion is a community problem. Some areas are parts of parks. (Management group VIIe–1)

Houghton Series

The Houghton series consists of deep, level to depressional, very poorly drained, organic soils that formed in fibrous plant remains deposited in swampy areas. These soils are in low areas in parts of the county west of the Des Plaines River. The native vegetation consisted of sedges, reeds, swamp grass, and, in areas of Houghton peat, tamarack trees.

In a typical profile, the thick surface layer is either black muck, which is partly decomposed plant remains, or peat, which is mostly undecomposed plant remains. The underlying material is brown, less thoroughly decomposed plant material that in places is many feet thick.

These soils have variable permeability and very high available moisture capacity. The water table is at the surface most of the year, except in areas that have been drained. The organic-matter content is very high. The supply of phosphorus and potassium is low.

Typical profile of Houghton muck, 115 feet east of fence and 350 feet south of corner post, in the NE¼SE¼NE¼ sec. 24, T. 43 N., R. 9 E.

1—0 to 16 inches, black (N 2/0) muck containing some mineral material; structureless; very friable; neutral; gradual, smooth boundary.

2—16 to 36 inches, black (N 2/0) muck; structureless; very friable; neutral; gradual, wavy boundary.

3—36 to 60 inches, black (N 2/0) muck; pockets of dark-brown (10YR 4/3 and 3/3) undecomposed plant material; very friable; slightly acid.

The surface layer varies considerably because of variations in the composition of the mineral soil materials washed in from surrounding higher areas, in the degree to which plant material has decomposed, and in the reaction. The depth to mineral materials varies considerably. The layers of organic matter are commonly thin over mineral material near the perimeter of swampy areas. Peat is more brownish in color and more acid in reaction than muck.

Houghton muck (103).—This soil is level to depressional and is subject to ponding. It can revert to Houghton muck, wet, if drainage outlets are obstructed or drainage systems are not maintained. Included in mapping were small areas of Peotone silty clay loam or some other surrounding soils. Also included were small areas of muck that is shallow to mineral materials and areas of calcareous material.

A large acreage is cultivated, although the limitations of wetness and lack of bearing strength are very serious. The use of fill material does not overcome the limitations for urban development, because the fill material is likely to sink into the unstable muck. (Management group IIIw–4)

Houghton muck, wet (W103).—This soil is level to depressional. It receives runoff from surrounding uplands and is subject to ponding. The water table is at or near the surface most of the year. The cover consists of cattails and swamp grass.

Included in mapping were small areas of mineral soils around the edges of the marshes. Also included were small areas that are not marshy and that occupy higher positions in the landscape.

At present, this soil can be used only as habitat for wetland wildlife. If drained, it could be cultivated, but many areas cannot be drained. (Management group VIIIw–1)

Houghton peat, wet (W97).—This soil is level to depressional. It receives runoff from surrounding uplands and is subject to ponding. The water table is at or near the surface most of the year. The cover consists of tamarack trees, cattails, and swamp grass.

Included in mapping were small areas of mineral soils around the edges of the marshes. Also included were small areas that are not marshy and that occupy higher positions in the landscape.

At present, this soil can be used only as habitat for wetland wildlife. If drained, it could be cultivated, but many areas cannot be drained. (Management group VIIIw-1)

Made Land

Made land (Ml) consists of areas of manmade cuts and fills and areas covered almost entirely with roads and buildings. The cuts are of various depths. The fills have been made with various materials, including some that are not soil materials. (Not placed in a management group)

Markham Series

The Markham series consists of deep, nearly level to strongly sloping, well drained to moderately well drained soils that formed in thin silty deposits and the underlying calcareous glacial till of silty clay loam texture. These soils are on uplands in all parts of the county. The native vegetation consisted of grass and hardwood trees.

In a typical profile (fig. 5) the plow layer is very dark grayish-brown silt loam. Where undisturbed by plowing, the uppermost 7 inches of the surface layer is very dark gray and the lower 3 inches is dark grayish brown. The 31-inch subsoil consists of brown, firm silty clay loam in the upper part, dark yellowish-brown to brown, firm to very firm silty clay in the middle part, and brown, very firm, calcareous silty clay loam in the lower part. The underlying material is mixed yellowish-brown, dark yellowish-brown, and brown, compact, very firm, calcareous silty clay loam (glacial till).

These soils are medium acid. They have moderately slow permeability because of a somewhat clayey subsoil. The available moisture capacity is high. The water table is generally at least 3 feet below the surface.

Typical profile of Markham silt loam, 2 to 4 percent slopes, in a cropped field, 418 feet south of center of Illinois Highway 176 along farm lane and then 63 feet east, in the SW¼NW¼SE¼ sec. 22, T. 44 N., R. 10 E.

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A2—7 to 10 inches, dark grayish-brown (10YR 4/2) heavy silt loam; some very dark grayish-brown (10YR 3/2) stains from Ap horizon; moderate, fine or medium, granular structure; friable; medium acid; clear, smooth boundary.

B21t—10 to 16 inches, brown (10YR 4/3) silty clay loam; continuous coatings of brown (10YR 4/3) clay on all ped surfaces; moderate, very fine, subangular blocky structure; firm; medium acid; clear, smooth boundary.

IIB22t—16 to 24 inches, dark yellowish-brown (10YR 4/4) light silty clay; continuous coatings of brown (10YR 4/3) clay on all ped surfaces; weak, fine, prismatic structure breaking to moderate, medium to fine, subangular blocky; firm; slightly acid; clear, smooth boundary.

IIB23t—24 to 30 inches, brown (10YR 4/3) light silty clay; many, fine, distinct mottles of grayish brown (10YR 5/2) and yellowish brown (10YR 5/6); continuous coatings of dark grayish-brown (2.5Y 4/2) clay on all ped surfaces; moderate, medium, prismatic structure breaking to moderate, medium, subangular blocky; very firm; neutral; abrupt, smooth boundary.

IIB3—30 to 41 inches, brown (10YR 4/3) silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and grayish brown (10YR 5/2); continuous coatings of gray (5Y 5/1) clay on vertical ped surfaces and discontinuous coatings on horizontal ped surfaces; weak to moderate, medium, prismatic structure breaking to moderate, fine to medium, subangular blocky; very firm; calcareous; clear, smooth boundary.

IIC1—41 to 50 inches, mixed brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) or yellowish-brown (10YR 5/6 and 5/8) silty clay loam; continuous coatings of gray (5Y 5/1) clay on vertical ped surfaces, and patchy coatings on horizontal ped surfaces; weak to moderate, medium, prismatic structure breaking to moderate, medium, subangular blocky; very firm; calcareous; clear, smooth boundary.

IIC2—50 to 60 inches, mixed brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) and yellowish-brown (10YR 5/6 and 5/8) silty clay loam; massive; very firm; calcareous.

The A horizon and the B horizon vary considerably in thickness, depending on the degree of erosion. The B horizon ranges from 18 to 36 inches in thickness. In places the underlying material contains many pebbles and stones.

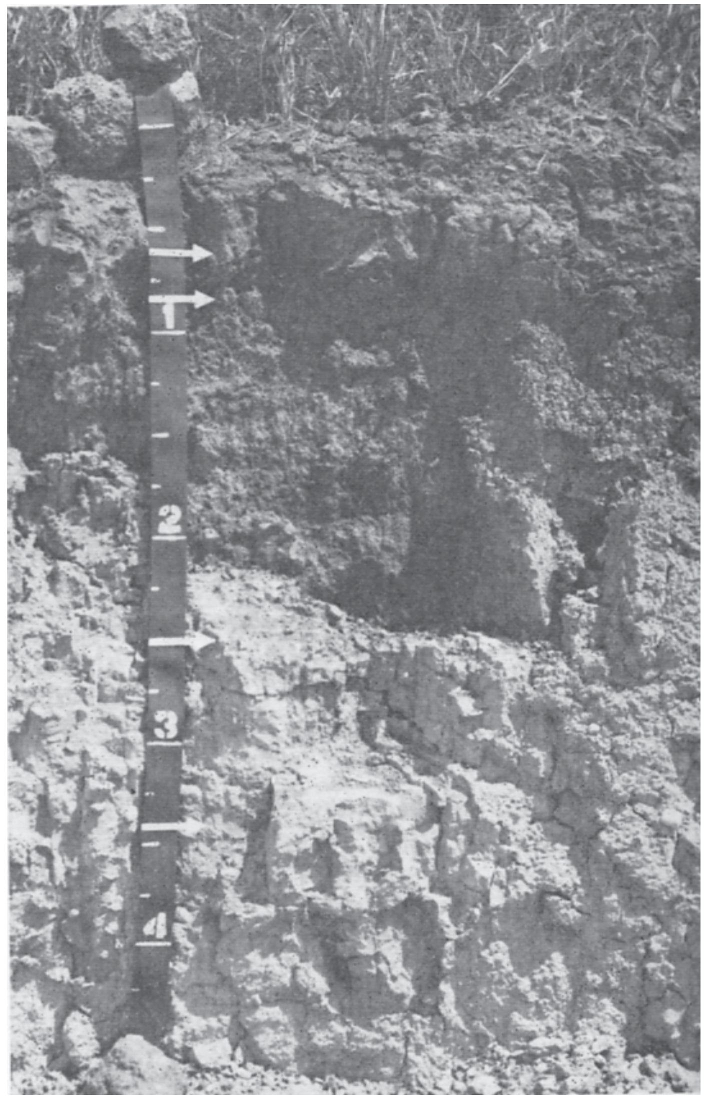

Figure 5.—Profile of Markham silt loam.

Markham soils have a finer textured subsoil and underlying material than Montmorenci soils. They have a darker colored surface layer than Morley soils and a brighter colored subsoil than Beecher soils.

Markham silt loam, 1 to 4 percent slopes (531B).—This soil is generally on the tops of morainic ridges. Included in mapping were small areas of Beecher silt loam, 2 to 4 percent slopes, and Elliott silt loam, 2 to 4 percent slopes, both of which are in slightly lower parts of the landscape. Also included were areas of Morley silt loam, which occurs in irregular patterns, and small areas of eroded soil.

This soil has not been farmed intensively in the many areas where it is associated with rolling soils. It is idle or is wooded in some areas. The most serious limitation is moderately slow movement of water through the soil. For most uses, slope is not a serious limitation. Only slight erosion has taken place. (Management group IIe–3)

Markham silt loam, 2 to 4 percent slopes, eroded (531B2).—This soil occurs as small areas near Markham silt loam, 1 to 4 percent slopes. Plowing has brought part of the subsoil into the surface layer, which is dark brown in color. Included in mapping were small areas of Morley silt loam, 2 to 4 percent slopes, eroded, and areas of Markham silt loam, 2 to 4 percent slopes.

Nearly all the acreage is or has been cultivated. Special management practices are needed if this soil is used with the less eroded soils surrounding it. The most serious limitations are moderately slow movement of water through the soil, rapid runoff, and an erosion hazard where the soil is cultivated. (Management group IIIe–1)

Markham silt loam, 4 to 7 percent slopes (531C).—This soil is generally on the tops of morainic ridges or on side slopes that have not been eroded. Included in mapping were small areas of Morley silt loam, 4 to 7 percent slopes. Also included were small eroded areas.

This soil has not been eroded, partly because of its position on the landscape and partly because it has not been farmed intensively. Many areas are lightly timbered or used as pasture. The limitations are the slope and moderately slow movement of water through the soil. In cultivated areas runoff is rapid and erosion is severe. (Management group IIIe–1)

Markham silt loam, 4 to 7 percent slopes, eroded (531C2).—This soil is generally on the side slopes of moraines. Plowing has brought part of the subsoil into the surface layer, which is dark brown in color. Included in mapping were small areas of Markham silt loam, 4 to 7 percent slopes, and Morley silt loam, 4 to 7 percent slopes, eroded. Also included were small areas of Markham silt loam, 2 to 4 percent slopes.

Most of the acreage is or has been cultivated, and special erosion control measures are needed in areas used for cropland. The chief limitations are rapid runoff, thinness of the surface layer, moderately slow movement of water through the soil, and a severe erosion hazard when the soil is cultivated. (Management group IIIe–1)

Markham silt loam, 7 to 12 percent slopes, eroded (531D2).—This soil is generally on the side slopes of moraines. Plowing has brought part of the subsoil into the surface layer, which is dark brown to brown in color.

Included in mapping were small areas of Markham silt loam, 7 to 12 percent slopes, and Morley silt loam, 7 to 12 percent slopes, eroded. Also included were small areas of a less sloping Markham soil.

Most of the acreage is or has been cultivated. Special erosion control measures are needed in areas used for cropland. The most serious limitations are strong slopes, rapid runoff, and a severe erosion hazard when the soil is cultivated. (Management group IVe–2)

Marsh

Marsh (MA) occurs north of Waukegan, where it is between Lake Michigan and the uplands, and among the lakes in the northwestern part of the county. In the Lake Michigan area it consists of a thin layer of undecomposed organic matter over gray sand, and in the northwestern part of the county, of undecomposed organic matter over loamy material.

Marsh is covered with water for long periods of time. Small areas have been reclaimed by dredging or filling, but drainage is not practical, because of the water level in the lakes. At present, the use of this land type is limited to habitat for wetland wildlife. (Management group VIIIw–1)

Martinton Series

The Martinton series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in moderately fine textured, calcareous, water-deposited sediments. These soils are in glacial lakebeds on uplands. The native vegetation was prairie grass.

In a typical profile the surface layer is black to very dark gray heavy silt loam about 14 inches thick. The 28-inch subsoil consists of dark grayish-brown, firm silty clay in the upper part and brown, firm, calcareous silty clay loam in the lower part. The upper part is mottled with yellowish brown. The underlying material consists of mottled, brown, compact, calcareous silty clay loam stratified with silt loam and thin layers of sand.

These soils are slightly acid to neutral in reaction. They have moderately slow permeability because the subsoil is somewhat clayey. The available moisture capacity is high. The water table is usually within 3 feet of the surface in spring.

Typical profile of Martinton silt loam, 0 to 2 percent slopes, at the eastern end of a triangular-shaped cropped field, 40 feet north of road center and 25 feet east of utility pole, in the NE¼NW¼SW¼ sec. 9, T. 44N., R. 10 E.

Ap—0 to 8 inches, black (10YR 2/1) heavy silty loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A3—8 to 14 inches, very dark gray (10YR 4/2) heavy silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

B21t—14 to 22 inches, dark grayish-brown (10YR 4/2) light silty clay; many fine, distinct mottles of yellowish brown (10YR 5/6); moderate, very fine, subangular blocky structure; continuous coatings of very dark gray (10YR 3/1) clay; firm; slightly acid; clear, smooth boundary.

B22t—22 to 27 inches, dark grayish-brown (10YR 4/2) silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/6) and common, fine, distinct mottles of grayish brown (2.5Y 5/2); weak, fine, prismatic structure breaking to moderate, fine, subangular

blocky; continuous coatings of dark-gray (10YR 4/1) clay on blocks; neutral; firm; clear, smooth boundary.

B3—27 to 42 inches, brown (10YR 5/3) silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6 and 5/8) and gray (5Y 5/1); weak, medium, prismatic structure breaking to moderate, medium, angular blocky; continuous coatings of dark-gray (5Y 4/1) clay on all ped surfaces; firm; calcareous; gradual, smooth boundary.

C—42 to 60 inches, brown (10YR 5/3) silty clay loam stratified with thin layers of silt and sand; many, medium, distinct mottles of yellowish brown (10YR 5/6 and 5/8) and gray (5Y 5/1); weak, medium to coarse, prismatic structure to massive; discontinuous coatings of dark-gray (5Y 4/1) clay on vertical ped surfaces; calcareous.

The A horizon ranges from black to very dark grayish brown in color. The B horizon ranges from 20 to 36 inches in thickness. The depth to calcareous lakebed sediments ranges from 24 to 42 inches.

Martinton soils have a darker colored surface layer than Del Rey soils. They have a finer textured subsoil and underlying material than Mundelein soils. Martinton soils have a somewhat darker colored, finer textured surface layer and a darker colored B2t horizon than Frankfort soils.

Martinton silt loam, 0 to 2 percent slopes (189A).—This soil is in intermorainal areas that were once lakebeds. It occurs in many parts of the county. Included in mapping were small areas of soil similar to Del Rey soils and low areas of Ashkum silty clay loam. Also included were small areas of Mundelein soils, small areas that have slopes of more than 2 percent, and areas in which the deposit of lakebed sediments is less than 3½ feet thick.

This soil is well suited to the crops commonly grown, and it is farmed intensively. The limitations are a seasonal high water table and moderately slow movement of water through the soil. (Management group IIw–1)

Martinton silt loam, 2 to 4 percent slopes (189B).—This soil is in intermorainal areas that were once lakebeds. It occurs in many parts of the county. Included in mapping were small areas similar to Del Rey soils and low areas of Ashkum silty clay loam. Also included were small areas of Martinton silt loam, 0 to 2 percent slopes, and areas of a Martinton soil that has been eroded enough that plowing has brought part of the subsoil into the plow layer.

This soil is well suited to the crops commonly grown, and it is farmed intensively. The limitations are a seasonal high water table and moderately slow movement of water through the soil. For most uses, slope is not a serious limitation, but erosion is a hazard if farming is intensive. (Management group IIe–2)

Miami Series

The Miami series consists of deep, gently sloping to strongly sloping, well drained to moderately well drained soils that formed in thin silty deposits and the underlying calcareous glacial till of loam and silt loam texture. These soils are on uplands and occur in the northern and western parts of the county. The native vegetation consisted of hardwood forest.

In a typical profile the plow layer is dark grayish-brown silt loam. Where undisturbed by plowing, the uppermost 3 inches of the surface layer is very dark gray and the lower 5 inches is grayish brown. The 32-inch subsoil consists of brown, firm silty clay loam in the upper part, yellowish-brown, firm, calcareous silty clay loam in the middle part, and brown, calcareous, firm silt loam in the lower part. The underlying material is brown, compact silt loam (glacial till). This material contains many pebbles and stones.

These soils are medium acid to strongly acid. Permeability is moderate in most places but moderately slow in some places. The available moisture capacity is high. The water table is generally at least 3 feet below the surface.

Typical profile of Miami silt loam, 2 to 4 percent slopes, in a wooded pasture, 75 feet east of road center and 150 feet north of gate, on narrow ridgetop, in the NW¼NW¼NE¼ sec. 7, T. 46 N., R. 11 E.

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; medium acid; abrupt, smooth boundary.

A2—3 to 8 inches, grayish-brown (10YR 5/2) silt loam; some very dark gray (10YR 3/1) material from the A1 horizon; weak, thin, platy structure to weak, fine, granular; friable; medium acid; abrupt, smooth boundary.

B1t—8 to 11 inches, brown (7.5YR 4/4) light silty clay loam; moderate, fine, subangular blocky structure; firm; strongly acid; stones are common; clear, smooth boundary.

B21t—11 to 18 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; discontinuous coatings of light-gray (10YR 7/1) silt; firm; stones are common; strongly acid; clear smooth boundary.

B22t—18 to 25 inches, brown (7.5YR 4/4) silty clay loam; moderate, fine, subangular to angular blocky structure; continuous coatings of dark yellowish-brown (10YR 3/4) clay on all ped surfaces; firm; stones are common; medium acid; clear, smooth boundary.

B31t—25 to 33 inches, yellowish-brown (10YR 5/4) light silty clay loam; weak, medium, prismatic structure breaking to moderate, fine to medium, angular blocky; continuous coatings of dark yellowish-brown (10YR 4/4) clay on all ped surfaces; firm; calcareous; stones are common; gradual, smooth boundary.

B32—33 to 40 inches, brown (10YR 5/3) gritty silt loam; weak, medium, prismatic structure breaking to moderate, medium, angular blocky; discontinuous coatings of dark-brown (10YR 4/3) clay on vertical ped surfaces; firm; calcareous; stones are common; gradual, smooth boundary.

C—40 to 60 inches, brown (10YR 5/3) gritty silt loam; compact; weak, medium to coarse, prismatic structure to massive; stones are common; calcareous.

The A horizon and the B horizon vary considerably in thickness because of the variations in slope and in erosion. The B horizon ranges from 15 to 36 inches in thickness. The B2 horizon ranges from silty clay loam to clay loam in texture. The B3 horizon is silty clay loam, silt loam, or loam. The C horizon ranges from brown to mixed brown and light brownish gray in color and from silt loam to loam in texture.

Miami soils are coarser textured in the subsoil and in the underlying material than Morley soils. They have a lighter colored surface layer in cultivated areas than Montmorenci soils. Miami soils have more compact, finer textured underlying material than Zurich soils.

Miami silt loam, 2 to 4 percent slopes (27B).—This soil is in morainal areas. Included in mapping were small areas of Montmorenci silt loam and some of soils that have textures in the subsoil and substratum approaching those in the subsoil and substratum of Morley soils. Also included were small areas of Miami silt loam, 4 to 7 percent slopes, eroded.

Many areas are either wooded or have not been farmed intensively. The main limitation is the moderately slow movement of water through the compact material under the subsoil. Only slight erosion has taken place. (Management group IIe–1)

Miami silt loam, 4 to 7 percent slopes (27C).—This soil is generally on the tops of side slopes of morainic ridges. Included in mapping were small areas of Montmorenci silt loam. Also included were small eroded areas and small areas of Miami silt loam, 2 to 4 percent slopes.

This soil is mainly in woods or in unimproved pasture. Some areas are used for individual homesites. The main limitations are the slope and the irregularly shaped areas surrounded by more rolling soils. (Management group IIe–1)

Miami silt loam, 4 to 7 percent slopes, eroded (27C2).—This soil is generally on the sides of morainic ridges. The present surface layer is brown because plowing has mixed part of the subsoil with what remains of the original surface layer. Included in mapping were small areas of Miami silt loam, 4 to 7 percent slopes, and Miami silt loam, 2 to 4 percent slopes. Also included were small areas of Miami silt loam, 7 to 12 percent slopes, eroded.

Most of the acreage is or has been cultivated, and where used for cropland, special erosion control measures are needed. The main limitations are the slope and a very thin surface layer. Runoff is rapid and the erosion hazard is severe when the soil is cultivated. (Management group IIIe–1)

Miami silt loam, 7 to 12 percent slopes (27D).—This soil is generally on uneroded and timbered slopes of morainic ridges. Included in mapping were small areas of Miami silt loam, 4 to 7 percent slopes, and Miami silt loam, 7 to 12 percent slopes, eroded.

This soil is mainly in woods or unimproved pasture. Some areas are used for individual homesites. The most serious limitations are the slope and the erosion hazard. In areas used for cropland, special erosion control measures are needed. (Management group IIIe–1)

Miami silt loam, 7 to 12 percent slopes, eroded (27D2).—This soil is generally on the eroded slopes of moraines. The present surface layer is brown because plowing has mixed part of the subsoil with what remains of the original surface layer. Included in mapping were small areas of Miami silt loam, 7 to 12 percent slopes, and Miami silt loam, 4 to 7 percent slopes, eroded.

Most of the acreage is or has been clutivated. The most serious limitations are the slope and the severe erosion hazard when the soil is cultivated. In areas used for cropland, special erosion control measures are needed. (Management group IVe–2)

Montgomery Series

The Montgomery series consists of deep, level to depressional, poorly drained to very poorly drained soils that formed in clayey lake-laid or glacial till deposits. These soils occur in low areas, mainly in the eastern part of the county. The native vegetation consisted of swamp grass and other water-tolerant grass.

In a typical profile, the surface layer is black silty clay about 11 inches thick. The 31-inch subsoil consists of grayish-brown, mottled, very firm silty clay in the upper part and of mixed olive-gray and light olive-brown, calcareous silty clay in the lower part. The underlying material is mixed light olive-brown and olive-gray, compact, firm, calcareous silty clay.

These soils are neutral in reaction. Because of their clayey texture, they have slow permeability. The available moisture capacity is high. The water table is at or close to the surface in spring but is 1 foot to 4 feet below the surface the rest of the year. The organic-matter content is high.

Typical profile of Montgomery silty clay, in an idle field, 255 feet west of road center and 25 feet north of a line running east and west through fireplug, in the northwestern corner of the SW¼NW¼NE¼ sec. 35, T. 44 N., R. 11 E.

A1—0 to 6 inches, black (N 2/0) light silty clay; moderate, very fine, granular structure; friable; neutral; clear, smooth boundary.

A3—6 to 11 inches, black (10YR 2/1) silty clay; few, fine, faint mottles of olive brown (2.5Y 4/4); moderate, very fine, angular blocky structure; neutral; firm; clear, smooth boundary.

B21g—11 to 18 inches, grayish-brown (2.5Y 5/2) silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/4 and 5/6) and gray (10YR 5/1); moderate, medium, prismatic structure breaking to moderate, medium, angular blocky; continuous coatings of black (10YR 2/1) clay on all ped surfaces; very firm; slightly acid; clear, smooth boundary.

B22g—18 to 32 inches, grayish-brown (2.5Y 5/2) silty clay; many, fine, distinct mottles of light olive brown (2.5Y 5/6) and gray (10YR 5/1); moderate, medium, prismatic structure breaking to moderate, medium, angular blocky; discontinuous coatings of black (N 2/0) and dark-gray (N 4/0) clay; very firm; mildly alkaline; clear, smooth boundary.

B3g—32 to 42 inches, mixed olive-gray (5Y 5/2) and light olive-brown (2.5Y 5/6) silty clay; moderate, medium, prismatic structure breaking to moderate, medium to coarse, angular blocky; discontinuous coatings of dark-gray (N 4/0) clay; very firm; calcareous; gradual, smooth boundary.

C—42 to 60 inches, mixed light olive-brown (2.5Y 5/4) and olive-gray (5Y 5/2) silty clay; moderate to coarse prismatic structure to massive; compact; calcareous.

The A horizon ranges from 10 to 15 inches in thickness. Variations in thickness, color, and texture occur where these soils have received recent deposits from surrounding soils. The B horizon ranges from 20 to 36 inches in thickness. The C horizon ranges from mixed gray and olive brown to yellowish brown in color and from silty clay to silty clay loam in texture.

Montgomery soils are darker colored and finer textured than Frankfort soils. They are finer textured throughout the profile than Ashkum and Pella soils.

Montgomery silty clay (465).—This soil is level to depressional. It occurs on low parts of the landscape. Included in mapping were small areas of Frankfort silt loam and Nappanee silt loam. Also included were small areas of Peotone silty clay loam.

Large areas of this soil are farmed, but many small areas occur as drainageways or potholes surrounded by wooded areas of Nappanee silt loam. A large part of the acreage has been drained and can be cultivated, but some has not been drained and consequently is not cultivated. Serious limitations are clayey texture, low position, and a high water table. These limitations seriously affect the use of the soil in urban development. (Management group IIIw–3)

Montmorenci Series

The Montmorenci series consists of deep, gently sloping, well drained to moderately well drained soils that formed in thin silty deposits and the underlying calcareous glacial till of silt loam and loam. These soils are on uplands, mainly in the northern and southwestern parts of the county. The native vegetation consisted of prairie grass and hardwood trees.

In a typical profile, the surface layer is very dark gray sists of dark yellowish-brown to brown, firm silty clay sists of dark yellowish-brown to brown, firm, silty clay loam in the upper part and mixed light brownish-gray and yellowish-brown calcareous silt loam in the lower part. The underlying material is mixed yellowish-brown and light brownish-gray, compact, calcareous silt loam (glacial till). This material contains many pebbles and stones.

These soils are slightly acid to neutral in reaction. They have moderate permeability in most places but moderately slow permeability in some places. The available moisture capacity is high. The water table is generally at least 3 feet below the surface.

Typical profile of Montmorenci silt loam, 2 to 4 percent slopes, directly across the road from a house, in the northeast corner of NE¼SE¼SE¼ sec. 29, T. 45 N., R. 11 E.

Ap—0 to 8 inches, very dark gray (10YR 3/1) silt loam; patches of dark grayish-brown (10YR 4/2) material from the A2 horizon; moderate, very fine, granular structure; friable; mildly alkaline; abrupt, smooth boundary.

B1t—8 to 11 inches, brown (10YR 4/3) light silty clay loam; moderate, very fine, subangular blocky structure; firm; neutral; stones are common; clear, smooth boundary.

B21t—11 to 21 inches, dark yellowish-brown (10YR 4/4) silty clay loam; discontinuous coatings of very dark gray (10YR 3/1) clay on all ped surfaces; moderate, fine, subangular blocky structure; firm; slightly acid; stones are common; clear, smooth boundary.

B22t—21 to 25 inches, brown (10YR 5/3) silty clay loam; discontinuous coatings of very dark gray (10YR 3/1) clay on all ped surfaces; weak, fine, prismatic structure breaking to moderate, medium to fine, angular blocky; firm; stones are common; calcareous; clear, smooth boundary.

B3—25 to 40 inches, mixed light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/6) silt loam; weak, medium, prismatic structure breaking to weak, medium to coarse, angular blocky; friable; calcareous; stones are common; gradual, smooth boundary.

C—40 to 60 inches, mixed light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/6 and 5/4) silt loam; compact; weak, moderate, prismatic structure to massive; stones are common; calcareous.

The A horizon ranges from very dark grayish brown to black in color and from 7 to 12 inches in thickness. It is dark brown in eroded areas. Small areas that have some sand in the surface layer occur throughout the areas of these soils. The B horizon ranges from 18 to 32 inches in thickness. The B3 and C horizons range from silt loam to loam in texture.

Montmorenci soils have a darker colored surface layer in cultivated areas than Miami soils. They have a somewhat lighter colored surface layer than Corwin soils. Montmorenci soils have somewhat less permeability than Grays soils because they have a finer texture and more compactness in the substratum.

Montmorenci silt loam, 2 to 4 percent slopes (57B).—This soil is in morainal areas. Included in mapping were small areas of Corwin silt loam and Miami soils. Also included were small areas of loam and small areas of Montmorenci silt loam, 4 to 7 percent slopes, eroded.

This soil is suited to the crops commonly grown and is intensively farmed. It is only slightly eroded because of its position on the landscape. Erosion is not a serious hazard, and there are no serious limitations for most uses. (Management group IIe-1)

Montmorenci silt loam, 4 to 7 percent slopes, eroded (57C2).—This soil is generally on the side slopes of morainic ridges. The present surface layer is dark brown because plowing has mixed part of the subsoil with what remains of the original surface layer.

Included in mapping were small areas of Miami silt loam and small uneroded areas of Montmorenci silt loam.

Most of the acreage is or has been cultivated, and in areas used for cropland, special erosion control measures are needed. The main limitations are the slope and the thinness of the surface layer. When the soil is cultivated, runoff is rapid and the erosion hazard is severe. (Management group IIIe-1)

Morley Series

The Morley series consists of deep, gently sloping to steep, well drained to moderately well drained soils that formed in thin silty deposits and the underlying calcareous glacial till of silty clay loam texture. These soils are on uplands and occur in all parts of the county. The native vegetation consisted of hardwood forest.

In a typical profile, the plow layer is dark grayish-brown silt loam. Where undisturbed by plowing, the upper 4 inches of the surface layer is very dark gray and the lower 5 inches is grayish brown. The 25-inch subsoil consists of brown to dark-brown, firm silty clay loam and silty clay in the upper part and calcareous silty clay loam in the lower part. The underlying material is brown, mottled, compact, firm, calcareous silty clay loam (glacial till).

These soils are slightly acid to strongly acid. They have moderately slow permeability because the subsoil is somewhat clayey. The available moisture capacity is high. The water table is generally at least 3 feet below the surface.

Typical profile of Morley silt loam, 2 to 4 percent slopes, in a wooded area, 25 feet south of road center and 15 feet east of farm lane, in the northwest corner of SW¼SW¼SE¼ sec. 31, T. 44 N., R. 10 E.

A1—0 to 4 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—4 to 9 inches, grayish-brown (10YR 5/2) silt loam; weak, very thin, platy structure; friable; strongly acid; clear, smooth boundary.

IIB1t—9 to 14 inches, dark-brown to brown (10YR 4/3) silty clay loam; moderate to strong, fine, subangular blocky structure; firm; very thin, continuous coatings of dull-gray to light-gray (10YR 6/1) silt on vertical surfaces of peds; strongly acid; clear, smooth boundary.

IIB21t—14 to 19 inches, dark-brown (10YR 4/3) heavy silty clay loam; strong, fine, subangular blocky structure; very firm; thin, patchy, shiny coatings of very dark gray (10YR 3/1) clayey organic material on vertical

surfaces of the peds; strongly acid; clear, smooth boundary.

IIB22t—19 to 28 inches, very dark grayish-brown (10YR 3/2) silty clay; strong, medium, angular blocky structure breaking to moderate to strong, fine, subangular blocky structure when disturbed; very firm; many, fine, faint mottles of yellowish brown (10YR 5/6); thick, continuous, shiny coatings of very dark brown (10YR 2/2) clayey organic material on vertical surfaces of the peds; neutral; clear, smooth boundary.

IIB3—28 to 34 inches, brown (10YR 5/3) silty clay loam; moderate, medium, subangular blocky structure; firm; many, fine, faint mottles of yellowish brown (10YR 5/6 and 5/8); moderately alkaline; clear, smooth boundary.

IIC1—34 to 42 inches, brown (10YR 5/3) silty clay loam; compact; moderate, medium to coarse, subangular and angular blocky structure; firm; many, medium, distinct mottles of gray (5Y 5/1) and many, medium, faint mottles of yellowish brown (10YR 5/6); calcareous; clear, smooth boundary.

IIC2—42 to 60 inches, brown (10YR 5/3) silty clay loam; compact; weak, coarse, angular blocky structure grading to massive; many, medium, distinct mottles of gray (5Y 5/1); calcareous.

The considerable variations in thickness of the A horizon and the IIB horizon are caused by the variations in steepness and erosion. The IIB horizon ranges from 15 to 36 inches in thickness. In places it is yellowish brown.

Morley soils typically have a finer textured lower subsoil and underlying material than Miami soils. They have a lighter colored surface layer than Markham soils. Morley soils have more compact and stony underlying material than Saylesville soils, and in many places the underlying material contains many pebbles and stones.

Morley silt loam, 2 to 4 percent slopes (194B).—This soil is generally on the tops of morainic ridges. Included in mapping were small areas of Beecher silt loam, which are in slightly lower parts of the landscape, and irregularly shaped areas of Markham silt loam. Also included were small areas of Morley silt loam, 4 to 7 percent slopes, eroded.

Many areas have not been farmed intensively, because they are wooded or idle. The most serious limitation is moderately slow movement of water through the soil. Slope is not a serious limitation for most uses. (Management group IIe–3)

Morley silt loam, 2 to 4 percent slopes, eroded (194B2).—This soil occurs as small areas near areas of Morley silt loam, 2 to 4 percent slopes. The surface layer is brown. It is a mixture of subsoil and what remains of the original surface layer. Included in mapping were small areas of Morley silt loam, 4 to 7 percent slopes, eroded, and areas of Markham silt loam, which is darker colored.

Nearly all the acreage is or has been cultivated. Special management practices are needed if this soil is used with the surrounding uneroded soils. The most serious limitations are moderately slow movement of water through the soil, and, where the soil is cultivated, rapid runoff and an erosion hazard. Slope is not a serious limitation for most uses. (Management group IIIe–1)

Morley silt loam, 4 to 7 percent slopes (194C).—This soil is generally on the tops and on uneroded side slopes of morainic ridges. Included in mapping were small areas of Markham silt loam, 4 to 7 percent slopes, and Morley silt loam, 2 to 4 slopes. Also included were small eroded areas.

This soil is mainly in trees or unimproved pasture. Some areas are used for individual homesites. The main limitations are moderately slow movement of water through the soil and the slope. (Management group IIIe–1)

Morley silt loam, 4 to 7 percent slopes, eroded (194C2).—This soil is on the side slopes of glacial moraines. The present surface layer is brown. It is a mixture of part of the subsoil and what remains of the original surface layer. Included in mapping were small areas of Morley silt loam, 4 to 7 percent slopes, of Markham silt loam, 4 to 7 percent slopes, and of Morley silt loam, 2 to 4 percent slopes.

Most of the acreage is or has been cultivated. Special erosion control measures are needed if crops are grown. The chief limitations are the slope, thinness of the surface layer, restricted movement of water through the soil, rapid runoff, and a severe erosion hazard when the soil is cultivated. (Management group IVe–2)

Morley silt loam, 7 to 12 percent slopes (194D).—This soil is generally on uneroded or timbered slopes of morainic ridges. Included in mapping were small areas of less sloping Morley silt loam and small areas of steeper Morley silt loam. Also included were small eroded areas.

This soil is mainly in trees or unimproved pasture. Some areas are being used for individual homesites. The most serious limitations are moderately slow movement of water through the soil and the hazard of erosion where the soil is cultivated. (Management group IIIe–1)

Morley silt loam, 7 to 12 percent slopes, eroded (194D2).—This soil is generally on the side slopes of moraines. The present surface layer is brown. It is a mixture of subsoil and what remains of the original surface layer. Included in mapping were small uneroded areas of Morley silt loam, 7 to 12 percent slopes, and small uneroded and eroded areas that have slopes of 12 to 25 percent.

Most of the acreage is or has been cultivated. Special erosion control measures are needed if crops are grown. The most serious limitations are strong slopes and the severe erosion hazard when the soil is cultivated. (Management group IVe–2)

Morley silt loam, 12 to 25 percent slopes (194E).—This soil generally is on uneroded or timbered slopes of moraines. Included in mapping were small areas of Morley silt loam that is less steep and small areas of Morley soils that are eroded.

This soil is mainly wooded or used as unimproved pasture. A few areas on the narrow ridges can be used for homesites if accessible. The limitations are the slope and the irregular topography. (Management group VIe–1)

Morley silt loam, 12 to 25 percent slopes, eroded (194E2).—This soil is generally on the slopes of moraines or on the slopes bordering stream channels. In areas that have been cultivated, the present surface layer is brown and is a mixture of part of the subsoil and what remains of the original surface layer. In some uncultivated areas, the surface layer is naturally thin. Included in mapping were small areas of Morley silt loam that has less slope and small areas of Morley soils that have a thick surface layer.

This soil is mainly in unimproved pasture, cropland, or woodland that has been heavily pastured. A few acres

where the narrow ridges are accessible and large enough can be used for homesites. The limitations are the slope, irregular topography, and the erosion hazard. (Management group VIIe-1)

Mundelein Series

The Mundelein series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in 2 or 3 feet of silty material over calcareous, stratified silt and sand. These soils are on uplands, mainly in the southern and eastern parts of the county. The native vegetation was prairie grass.

In a typical profile, the surface layer is black to very dark gray silt loam about 13 inches thick. The upper part of the 23-inch subsoil consists of dark grayish-brown silty clay loam that is mottled with yellowish brown, the middle part consists of light olive-brown silty clay loam, and the lower part of grayish-brown, mottled calcareous silt loam to loam. The underlying material consists of mixed yellowish-brown and gray, calcareous sandy loam over mixed greenish-gray, gray, and yellowish-brown, stratified silt and sand.

These soils are slightly acid. They have moderate permeability and high available moisture capacity. The water table is generally 1 foot to 3 feet below the surface in spring.

Typical profile of Mundelein silt loam, 0 to 2 percent slopes, 100 feet south of east-west road and 35 feet west of center of lane, in the southeast corner of SE¼SE¼NE¼ sec. 20, T. 43 N., R. 11 E.

A1—0 to 10 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable; neutral; clear, smooth boundary.

A3—10 to 13 inches, very dark gray (10YR 3/1) silt loam; moderate, fine to medium, granular structure; friable; slightly acid; clear, smooth boundary.

B21t—13 to 17 inches, dark grayish-brown (10YR 4/2) silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/6); moderate, very fine to fine, subangular blocky structure; coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; firm; slightly acid; clear, smooth boundary.

B22t—17 to 23 inches, dark grayish-brown (10YR 4/2) silty clay loam; weak, very fine, prismatic structure breaking to moderate, fine, subangular blocky; coatings of dark gray (10YR 4/1) to very dark gray (10YR 3/1) clay on all ped surfaces; firm; slightly acid; clear, smooth boundary.

IIB23t—23 to 26 inches, light olive-brown (2.5Y 5/4), light gritty silty clay loam; many, medium, distinct mottles of yellowish brown (10YR 5/6 and 5/8); weak, fine to medium, prismatic structure breaking to moderate, medium, angular blocky; friable; slightly acid; clear, smooth boundary.

IIB3—26 to 36 inches, grayish-brown (2.5Y 5/2) gritty silt loam to loam; many, medium, distinct mottles of yellowish brown (10YR 5/6 and 5/8); weak, medium to coarse, prismatic structure breaking to weak, medium to coarse, angular blocky; discontinuous coatings of olive-gray (5Y 5/2) clay on vertical ped surfaces; friable; calcareous; clear, smooth boundary.

IIC1—36 to 48 inches, mixed gray (5Y 5/1) and yellowish-brown (10YR 5/6) sandy loam; weak, medium to coarse, prismatic structure; discontinuous coatings of dark-gray (10YR 4/1) clay on vertical ped surfaces; friable; calcareous; gradual, smooth boundary.

IIC2—48 to 60 inches, mixed greenish-gray (5GY 6/1), gray (5Y 5/1), and yellowish-brown (10YR 5/6 and 5/8), stratified silt and sand; friable; calcareous.

The A horizon ranges from 10 to 14 inches in thickness and, because there has been no serious erosion, only from black to very dark gray in color. Small areas that have a coarser textured surface layer occur throughout the areas of these soils. The B horizon ranges from 18 to 30 inches in thickness. The IIC horizon contains a few thin layers of gravel in places.

Mundelein soils have a darker colored surface layer than Wauconda soils. They are somewhat more permeable than Odell soils because the lower part of the subsoil and the substratum are coarser textured and less compact.

Mundelein silt loam, 0 to 2 percent slopes (442A).—This soil occurs on outwash plains, mainly in the valley of the Des Plaines River. Included in mapping were small areas of Barrington silt loam, which occupies slightly higher parts of the landscape. Also included were small areas of Pella silty clay loam and areas that have a surface layer of loam and a gravelly substratum.

This soil is used mainly as cropland. The only limitation for other uses is the high water table in spring. (Management group I-2)

Mundelein silt loam, 2 to 4 percent slopes (442B).—This soil occurs on outwash plains, mainly in the valley of the Des Plaines River. Included in mapping were small areas of Wauconda silt loam and of Barrington silt loam, which occupies slightly higher parts of the landscape. Also included were small areas of Pella silty clay loam and areas that have a surface layer of loam and a gravelly substratum.

This soil is well suited to crops. Slight limitations are a seasonal high water table and the erosion hazard in gently sloping areas. (Management group IIe-2)

Mundelein and Elliott silt loams, 0 to 2 percent slopes (989A).—These soils are in intermorainal areas, generally in the central part of the county. Some areas contain only Mundelein silt loam and some only Elliott silt loam, but most contain some of each. The Mundelein soil is the more common. The Elliott soil has a finer textured subsoil and underlying material than the Mundelein soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Mundelein soil and underlying material of silty clay loam like that of the Elliott soil. Also included were small areas of Wauconda and Beecher silt loams, which are somewhat poorly drained, and Barrington and Varna silt loams, which occupy higher parts of the landscape and are moderately well drained to well drained. Other inclusions were small low-lying areas of Ashkum silty clay loam.

These soils are well suited to crops, and they are farmed intensively. The limitations are a seasonal high water table and, in the Elliott soils, moderately slow permeability. (Management group 1-2)

Mundelein and Elliott silt loams, 2 to 4 percent slopes (989B).—These soils are in intermorainal areas, generally in the central part of the county. Some areas contain only Mundelein silt loam and some only Elliott silt loam, but most contain some of each. The Mundelein soil is the more common. The Elliott soil has a finer textured subsoil and underlying material than the Mundelein soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like

those of the Mundelein soil and underlying material of silty clay loam like that of the Elliott soil. Also included in mapping were small areas of Wauconda and Beecher silt loams, 2 to 4 percent slopes, which are somewhat poorly drained, and Barrington and Varna silt loams, 2 to 4 percent slopes, which occupy slightly higher parts of the landscape and are moderately well drained to well drained. Other inclusions were small areas of Ashkum silty clay loam.

Most of the acreage is farmed intensively. Erosion is a slight hazard. The limitations are a seasonal high water table and the moderately slow permeability of the Elliott soils. (Management group IIe–2)

Nappanee Series

The Nappanee series consists of level to gently sloping, somewhat poorly drained soils that formed in thin silty deposits and the underlying calcareous glacial drift of silty clay texture. These soils are on uplands in all parts of the county but mainly in the southeastern part. The native vegetation consisted of hardwood forest.

In a typical profile the plow layer is dark grayish-brown silt loam about 8 inches thick. Where undisturbed by plowing, the upper part of the surface layer is very dark gray and the lower part is grayish brown. The 28-inch subsoil is light olive-brown to grayish-brown, mottled, firm silty clay loam and silty clay in the upper part and calcareous, gray silty clay mottled with yellowish brown in the lower part. The underlying material is brown, compact, very firm, calcareous silty clay (glacial drift). It is mottled with gray.

These soils are slightly acid to neutral in reaction. They have slow permeability because the subsoil and underlying material are clayey. The available moisture capacity is not always adequate for crops. The water table is generally within 3 feet of the surface in spring. In sloping areas, runoff is rapid and erosion is a serious hazard.

Typical profile of Nappanee silt loam, 0 to 2 percent slopes, on a wooded site, 75 feet west of north-south center of lane, in the southeast corner of SE¼SE¼NE¼ sec. 20, T. 43 N., R. 11 E.

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A2—3 to 8 inches, grayish-brown (10YR 5/2) silt loam; weak, thin, platy structure breaking to weak, coarse, granular; friable; slightly acid; clear, smooth boundary.

IIB1t—8 to 12 inches, light olive-brown to grayish-brown (2.5Y 5/3) gritty silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/4); thin, patchy, dull coatings of light-gray (10YR 7/2) silt on all ped surfaces; moderate, medium, subangular blocky structure; firm; medium acid; clear, smooth boundary.

IIB21t—12 to 19 inches, light olive-brown to grayish-brown (2.5Y 5/3) gritty silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/4 and 5/6); thin, continuous, dull coatings of dark grayish-brown (10YR 4/2) clay on all ped surfaces; moderate, medium, angular and subangular blocky structure; very firm; slightly acid; clear, smooth boundary.

IIB22t—19 to 27 inches, gray (5Y 5/1) gritty silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/6); thin, continuous, dull coatings of dark grayish-brown (10YR 4/2) clay on all ped surfaces; weak, medium, prismatic structure breaking to moderate, medium, subangular and angular blocky; very firm; neutral; abrupt, smooth boundary.

IIB3—27 to 36 inches, gray (5Y 5/1) light silty clay; many, fine, distinct mottles of yellowish brown (10YR 5/6); thick, continuous, dull coatings of gray (5Y 5/1) clay on vertical ped surfaces; weak, coarse, prismatic structure breaking to moderate, medium to coarse, angular blocky; very firm; calcareous; gradual, smooth boundary.

IIC—36 to 60 inches, brown (10YR 5/3) light silty clay; many, medium, distinct mottles of gray (5Y 5/1) and few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, coarse, prismatic structure to massive; very firm; calcareous.

The variations in thickness and color of the A horizon are caused by variations in slope and in erosion. The B horizon ranges from 15 to 30 inches in thickness. In places the C horizon is mixed yellowish brown and gray.

Nappanee soils have a grayer, finer textured subsoil and substratum than Morley and Saylesville soils. They have a lighter colored surface layer than Frankfort soils.

Nappanee silt loam, 0 to 2 percent slopes (228A).—This soil occurs generally on broad flats east of the Des Plaines River. Included in mapping were small areas of Frankfort silt loam, 0 to 2 percent slopes, and Montgomery silty clay, which is in slightly lower parts of the landscape. Also included were small areas of Zurich silt loam and small areas of Aptakisic silt loam.

None of this soil is cropped intensively. A large acreage is wooded or idle. The most serious limitations are slow movement of water through the soil, a seasonal high water table, and low productivity. The erosion hazard is negligible. (Management group IIIw–1)

Nappanee silt loam, 2 to 4 percent slopes (228B).—This soil occurs throughout the county but mostly east of the Des Plaines River. Included in mapping were small areas of Frankfort silt loam, 2 to 4 percent slopes, and small areas of Zurich silt loam and Aptakisic silt loam. Also included were small areas of Nappanee silt loam, 0 to 2 percent slopes, and small eroded spots.

Large acreages of this soil have never been farmed intensively or are still in woodland, and consequently there has been only slight erosion. The most serious limitations are slow movement of water through the soil, a seasonal high water table, low fertility, and in farmed areas, the erosion hazard. (Management group IIIe–2)

Nappanee silt loam, 4 to 7 percent slopes, eroded (228C2).—This soil is generally on the side slopes of moraines. Plowing has brought part of the subsoil into the surface layer. Included in mapping were small uneroded areas of Nappanee soil and small eroded and uneroded areas of Zurich soils.

Most of the acreage has been cultivated. Special erosion control measures are needed if crops are grown. The main limitations are slope, rapid runoff, a thin surface layer, slow movement of water through the soil, and a severe erosion hazard when the soil is cultivated. (Management group IVe–2)

Odell Series

The Odell series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in thin silty deposits and the underlying calcareous glacial till of silt loam and loam texture. These soils are on uplands,

mainly in the south-central part of the county. The native vegetation was prairie grass.

In a typical profile the surface layer is black to very dark grayish-brown silt loam about 10 inches thick. The 26-inch subsoil consists of 15 inches of dark grayish-brown to dark yellowish-brown, mottled, firm silty clay loam and 11 inches of yellowish-brown, mottled, firm, calcareous silt loam. The underlying material is mixed grayish-brown and yellowish-brown, compact, calcareous silt loam (glacial till). This material contains many pebbles and stones.

These soils are slightly acid to neutral in reaction. They have moderate permeability in most places but moderately slow permeability in some places. The available moisture capacity is high. The water table is generally 1 foot to 3 feet below the surface in spring.

Typical profile of Odell silt loam, 0 to 2 percent slopes, located 35 feet north of powerline pole and 75 feet west of center of road, in the SW¼SW¼NW¼ sec. 10, T. 43 N., R. 11 E.

A1—0 to 8 inches, black (10YR 2/1) heavy silt loam; moderate, fine, granular structure; friable; neutral; clear, smooth boundary.

A3—8 to 10 inches, very dark grayish-brown (10YR 3/2) heavy silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

B1t—10 to 14 inches, dark grayish-brown (10YR 4/2) silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/6); moderate, very fine, subangular blocky structure; coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; firm; medium acid; pebbles and stones are common; clear, smooth boundary.

B21t—14 to 20 inches, dark yellowish-brown (10YR 4/4) silty clay loam; many, fine, faint mottles of yellowish brown (10YR 5/6); weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; coatings of very dark grayish-brown (10YR 3/2) clay on all ped surfaces; firm; medium acid; pebbles and stones are common; clear, smooth boundary.

B22t—20 to 25 inches, dark yellowish-brown (10YR 4/4) silty clay loam; common, fine, faint mottles of yellowish brown (10YR 5/6 and 5/8); weak, medium, prismatic structure breaking to moderate, fine, subangular blocky; coatings of very dark gray (10YR 3/1) clay on all ped surfaces; firm; slightly acid; pebbles and stones are common; clear, smooth boundary.

B3—25 to 36 inches, yellowish-brown (10YR 5/6) heavy, gritty silt loam; common, medium, distinct mottles of grayish brown (2.5Y 5/2); weak, medium, prismatic structure breaking to weak, fine to medium, subangular blocky; coatings of olive-brown (2.5Y 4/4) clay on vertical ped surfaces; firm; calcareous; pebbles and stones are common; gradual, smooth boundary.

C1—36 to 58 inches, mixed yellowish-brown (10YR 5/4) and grayish-brown (2.5Y 5/2) gritty silt loam; common, fine, faint mottles of yellowish brown (10YR 5/6 and 5/8); weak, medium, prismatic structure breaking to weak, medium to coarse, angular and subangular blocky; coatings of greenish-gray (5GY 6/1) clay on vertical ped surfaces; firm; calcareous; pebbles and stones are common; gradual, wavy boundary.

C2—58 to 60 inches, mixed yellowish-brown (10YR 5/4 and 5/6) and grayish-brown (2.5Y 5/2) heavy silt loam; massive; firm; calcareous.

The A horizon ranges from 10 to 14 inches in thickness and from black to very dark grayish brown in color. Small areas that have a coarser textured surface layer occur throughout the areas of these soils. The B horizon ranges from 18 to 30 inches in thickness. The C horizon ranges from heavy silt loam to loam.

Odell soils have a darker colored surface layer than Montmorenci soils. They are somewhat less permeable than Mundelein soils because the lower part of the subsoil and the substratum are slightly finer textured and more compact.

Odell silt loam, 0 to 2 percent slopes (490A).—This soil is in intermorainal areas in the south-central part of the county. Included in mapping were small low areas of Pella silty clay loam, small areas of Corwin silt loam, which is on higher parts of the landscape, and areas of Odell silt loam, 2 to 4 percent slopes.

This soil is farmed intensively. There are no serious limitations that affect intensive cropping, but a seasonal high water table is a moderate limitation for some other uses. (Management group I–2)

Odell silt loam, 2 to 4 percent slopes (490B).—This soil is in intermorainal areas in the south-central part of the county. Included in mapping were small areas of Corwin soil, which has a brighter colored subsoil and occurs in slightly higher parts of the landscape. Also included were areas that have a surface layer of loam and small low areas of Pella silty clay loam.

Minor limitations are the slope and the seasonal high water table. The control of erosion is not a serious problem, even in gently sloping areas. (Management group IIe–2)

Pella Series

The Pella series consists of deep, level, poorly drained soils that formed in silty and clayey, water-deposited material over calcareous, medium-textured glacial drift. The drift consists of silt loam, loam, or sandy loam, is generally stratified, and in some places contains layers of gravel. These soils are in low areas in all parts of the county. The native vegetation was water-tolerant grass.

In a typical profile the surface layer is black to a very dark gray silty clay loam about 15 inches thick. The 27-inch subsoil is olive, olive-gray, and gray, firm silty clay loam in the upper part and mixed gray and yellowish-brown to strong-brown, calcareous, stratified silt loam, loam, and sandy loam in the lower part. The underlying material is mixed light brownish-gray and yellowish-brown, calcareous, stratified sandy loam, gravelly loam, and sand (glacial drift).

These soils are neutral or mildly alkaline in the surface layer and upper part of the subsoil, and they are calcareous in the lower part of the subsoil and in the substratum. They have moderate permeability and high available moisture capacity. The water table is within 1 foot of the surface in spring and 1 foot to 4 feet below the surface the rest of the year. The organic-matter content is high.

Typical profile of Pella silty clay loam, in cropland, 145 feet east of Highway 45 road edge on north side of lane, in the northeast corner of NW¼SE¼NE¼ sec. 22, T. 43 N., R. 11 E.

Ap—0 to 11 inches, black (N 2/0) silty clay loam; moderate, fine, granular structure; friable; mildly alkaline; abrupt, smooth boundary.

A3—11 to 15 inches, very dark gray (10YR 3/1) silty clay loam; moderate, fine, granular structure; friable; mildly alkaline; clear, smooth boundary.

B21g—15 to 19 inches, olive-gray (5Y 4/2) silty clay loam; common, fine, faint mottles of light olive brown (2.5Y 5/4); moderate, fine, subangular blocky structure; discontinuous coatings of very dark gray (10YR 3/1) clay; firm; mildly alkaline; clear, smooth boundary.

B22g—19 to 22 inches, gray (5Y 5/1) silty clay loam; many, fine, distinct mottles of olive (5Y 4/4) and yellowish brown (10YR 5/6); weak, fine, prismatic structure to moderate, fine, subangular blocky; discontinuous coatings of olive (5Y 4/3) clay; firm; mildly alkaline; abrupt, smooth boundary.

B31g—22 to 34 inches, olive (5Y 5/5) silty clay loam; many, medium, distinct mottles of light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6); weak, medium, prismatic structure to moderate, medium, angular blocky; discontinuous coatings of dark-gray (5Y 4/1) clay; firm; calcareous; clear, smooth boundary.

B32g—34 to 42 inches, mixed gray (5Y 5/1) and yellowish-brown (10YR 5/8) to strong-brown (7.5YR 5/8), stratified silt loam, loam, and sandy loam; weak, medium, prismatic structure to weak, medium, angular blocky; very friable; calcareous; gradual, smooth boundary.

Cg—42 to 60 inches, mixed light brownish-gray (2.5Y 6/2) and yellowish-brown (10YR 5/8), stratified sandy loam, gravelly loam, and sand; structureless; very friable; calcareous.

The A horizon ranges from 12 to 18 inches in thickness. The texture of this horizon varies only in the few places where there are recent deposits of soil material received from surrounding soils. The B horizon ranges from 20 to 36 inches in thickness and from olive and olive gray to dark grayish brown in color. The C horizon is silt loam, loam, sandy loam, or gravelly loam. This material is stratified in some places but not in others.

Pella soils have a coarser textured lower subsoil and substratum than Ashkum soils. They have a slightly thinner surface layer than Peotone soils. Pella soils differ from Harpster soils in not having free carbonates within 15 inches of the surface.

Pella silty clay loam (153).—This soil is level or nearly level. It occurs in low parts of the landscape and is subject to ponding in places. Included in mapping were small areas of Peotone silty clay loam and small wet spots that are shown by wet spot symbols on the map. Also included were small areas of Mundelein silt loam, Odell silt loam, Wauconda silt loam, and Harpster silty clay loam.

Most areas have been drained with tile or open ditches. A large acreage is cultivated and can be farmed intensively. The limitations for urban development are serious. The most serious limitation is wetness. (Management group IIw-2)

Peotone Series

The Peotone series consists of deep, level to depressional, very poorly drained soils that formed in thick, silty and clayey, water-deposited materials. These soils are in low areas in all parts of the county. The native vegetation was swamp grass.

In a typical profile the surface layer is black silty clay loam about 16 inches thick. The 32-inch subsoil is very dark gray to gray, mottled, firm silty clay loam. The underlying material is mixed gray and yellowish-brown, compact, firm, calcareous silty clay loam.

These soils are neutral in reaction. They have moderately slow permeability because of their clayey texture. The available moisture capacity is high. The water table is at the surface in spring. The rest of the year it is 1 foot to 4 foot below the surface, depending on the artificial drainage provided. The organic-matter content is high.

Typical profile of Peotone silty clay loam, in a depressional area, 120 feet east of highway center and 20 feet north of farm lane, in the northwest corner of NE¼NE¼SE¼ sec. 14, T. 43 N., R. 10 E.

A1—0 to 12 inches, black (N 2/0) silty clay loam; moderate, fine, granular structure; friable; neutral; clear, smooth boundary.

A3—12 to 16 inches, black (N 2/0) silty clay loam; moderate, very fine, subangular blocky structure; friable; neutral; clear, smooth boundary.

B21g—16 to 24 inches, very dark gray (5Y 3/1) heavy silty clay loam; few, fine, distinct mottles of light olive brown (2.5Y 5/4); moderate, medium, prismatic structure breaking to moderate, fine, subangular blocky; coatings of dark-gray (5Y 4/1) clay; firm; neutral; gradual, smooth boundary.

B22g—24 to 34 inches, dark-gray (5Y 4/1) silty clay loam; few, medium, distinct mottles of light olive brown (2.5Y 5/6); moderate, medium, prismatic structure breaking to moderate, fine to medium, angular blocky; clay coatings on blocks; firm; neutral; gradual, smooth boundary.

B3g—34 to 48 inches, gray (5Y 5/1) silty clay loam; few, medium, prominent mottles of yellowish brown (10YR 5/6); moderate, medium, prismatic structure breaking to moderate, medium, angular blocky; clay coatings on blocks; firm; mildly alkaline; gradual, smooth boundary.

Cg—48 to 60 inches, mixed gray (5Y 5/1) and yellowish-brown (10YR 5/6) silty clay loam; moderate, medium to coarse, prismatic structure to massive; firm; calcareous.

The thickness of the A horizon varies considerably because of recent deposits of soil materials received from surrounding higher areas. The B horizon ranges from 24 to 40 inches in thickness. The B3 horizon is calcareous in places. The C horizon ranges from loamy to clayey.

Peotone soils have a thicker surface layer and a grayer subsoil than Ashkum and Pella soils. They have a thinner surface layer than Sawmill soils, which occur in similar positions but are frequently flooded.

Peotone silty clay loam (330).—This soil is level to depressional. It is subject to ponding but is drained artificially. In some areas in the northwestern part of the county the texture is coarser. Included in mapping were small areas of Ashkum silty clay loam, Pella silty clay loam, and Harpster silty clay loam, all of which occur on slightly higher parts of the landscape. Also included were small areas of Houghton muck and small areas where there are many inches of recently deposited soil material.

This soil has been drained. At present nearly all the acreage is cultivated. The most serious limitations are low position and a high water table. The limitations for urban development are serious. (Management group IIw-3)

Peotone silty clay loam, wet (W330).—This soil is level to depressional. It is subject to ponding by water that runs off the surrounding uplands. The water table is at or near the surface most of the year. The vegetation consists of cattails and swamp grass. Included in mapping were small areas of Houghton muck, small areas of marsh, and spots of Harpster silty clay loam, which is calcareous. Also included were small areas of soils that occupy higher parts of the landscape and are not marshy.

Undrained areas can be used only as habitat for wetland wildlife. Drained areas can be cultivated, but some areas cannot be drained because outlets are lacking. The

limitations for urban development are serious (fig. 6.). (Management group VIIw-1)

Plainfield Series, Slightly Acid Variant

The Plainfield series consists of deep, nearly level to gently sloping, excessively drained to well-drained soils that formed in lake-deposited and wind-worked sand. These soils are on narrow ridges adjacent to Lake Michigan in the northern part of the county. The native vegetation consisted of a sparse cover of drought-resistant grass, shrubs, and trees.

In a typical profile the 7-inch surface layer is sand that is very dark gray in the uppermost 2 inches and dark grayish brown in the rest of the layer. The underlying material is yellowish-brown to pale-brown, loose sand that is slightly acid to moderately alkaline.

These soils have very low fertility. They have rapid permeability and very low available moisture capacity. The water table is always at least 3 feet below the surface.

Typical profile of Plainfield sand, slightly acid variant, located 320 feet north of road and 50 feet west of farm lane, in the NW¼SE¼NE¼ sec. 34, T. 46 N., R. 12 E.

A1—0 to 2 inches, very dark gray (10YR 3/1) sand; single grain; loose; medium acid; abrupt, smooth boundary.

A2—2 to 7 inches, dark grayish-brown (10YR 4/2) sand; single grain; loose; slightly acid; clear, smooth boundary.

C1—7 to 26 inches, yellowish-brown (10YR 5/4) sand; single grain; loose; slightly acid; gradual, wavy boundary.

C2—26 to 35 inches, pale-brown (10YR 6/3) sand; individual grains are yellowish-brown (10YR 5/6) and light gray (10YR 7/1); single grain; loose; moderately alkaline.

The A1 horizon ranges from 1 inch to 3 inches in thickness. The color of the A1 horizon ranges from very dark gray where there is a cover of vegetation, to dark grayish brown to yellowish brown where the surface is bare and has been eroded by wind.

Plainfield soils are not like any other soils in Lake County. The Plainfield soil in Lake County differs from most Plainfield soils outside the county in being calcareous at depths of 2 to 3 feet.

Plainfield sand, slightly acid variant, 1 to 4 percent slopes (V54).—This soil is on narrow ridges along the shore of Lake Michigan in the northern part of the county. It is mostly within Illinois Beach State Park. The areas nearest the lake are subject to wind erosion. Included in mapping were small areas of Beach sand and small areas of Granby loamy fine sand.

This soil has never been farmed. The areas nearest the lake have the least vegetation. Some areas have been planted to pine trees, but many other areas remain in native vegetation (fig. 7). The most serious limitations are very low available moisture capacity and very low fertility. (Management group VIIs-1)

Figure 6.—**Abandoned house on Peotone silty clay loam, wet.**

Figure 7.—**Native vegetation on Plainfield sand, slightly acid variant, 1 to 4 percent slopes, in an area of Illinois Beach State Park.**

Rodman Series

The Rodman series consists of hilly to very steep, excessively drained to well-drained soils that have loose, calcareous gravel and sand at a depth of less than 10 inches. These soils formed in glacial deposits of gravel and sand. They occur in the northwestern part of the county. The native vegetation consisted of grass and hardwood trees.

In a typical profile, the surface layer is very dark brown, gravelly loam about 7 inches thick. The underlying material is calcareous. It consists of large and small cobblestones and sand and gravel, but it is mainly yellowish-brown, stratified sand and gravel. Part of the gravel is very dark gray to light gray.

These soils are moderately alkaline, and they have variable fertility. They have rapid permeability and low available moisture capacity. The water table is always many feet below the surface.

Typical profile of Rodman gravelly loam, 15 to 50 percent slopes, located west side of pit, south of Grass Lake Road, in the northwestern corner of NE¼NW¼ sec. 33, T. 46 N., R. 9 E.

A1—0 to 7 inches, very dark brown (10YR 2/2) gravelly loam; weak, fine, granular structure; very friable; moderately alkaline; abrupt, smooth boundary.

C—7 to 60 inches, yellowish-brown (10YR 5/5, 5/6, and 5/8), stratified sand and gravel; individual sand grains and pebbles are light yellowish brown (10YR 6/4), very dark gray (10YR 3/1), and light gray (10YR 7/2); single grain; loose; calcareous.

Variations in thickness and color of the A horizon are caused by variations in slope and in erosion. The depth to calcareous gravel and sand ranges from 2 to 15 inches.

Rodman soils have a thicker surface layer but are less deep over sand and gravel than Casco soils, and they lack evidence of a B horizon. They are much coarser textured than Hennepin soils.

Rodman gravelly loam, 15 to 50 percent slopes (93F).—This soil is in the northwestern part of the county, mostly west of the Chain o' Lakes. Included in mapping were small areas of Casco loam and Fox loam and small areas of Boyer sandy loam.

This soil is mostly idle, in pasture, or in sparse stands of timber, but some areas are part of parks or recreational areas. The steep slopes and unfavorable soil conditions limit the use of this soil to recreation and to wildlife habitat. (Management group VIIs–1)

Sawmill Series

The Sawmill series consists of deep, level, poorly drained to very poorly drained soils that formed in silty and clayey, water-deposited material, some of very recent origin. These soils are on flood plains along the rivers and streams in all parts of the county. The native vegetation was swamp grass.

In a typical profile the surface layer is black silty clay loam about 20 inches thick. The 22-inch subsoil is very dark gray to gray, firm silty clay loam that is mottled with yellowish brown. The underlying material consists of mixed gray and yellowish-brown silty clay loam that, in many places, is stratified with layers of silt, loam, sand, and some gravel.

These soils are slightly acid to neutral in reaction, and they have high fertility. They are frequently flooded. They have moderate permeability in the subsoil. The available moisture capacity is very high. The water table is at or near the surface in spring, but the depth to the water table during the rest of the year depends upon the water level in the streams and the artificial drainage that may be provided. The organic-matter content is high.

Typical profile of Sawmill silty clay loam, in cropland, halfway between road and stream channel, 330 feet south of bridge, in the southwest corner of the SW¼NW¼SE¼ sec. 7, T. 43 N., R. 11 E.

Ap—0 to 8 inches, black (N 2/0) light silty clay loam; moderate, fine to medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A3—8 to 20 inches, black (N 2/0) light silty clay loam; moderate, fine, granular structure; friable; slightly acid; gradual, smooth boundary.

B1g—20 to 28 inches, very dark gray (N 3/0) silty clay loam; moderate, fine, subangular blocky structure; firm; neutral; clear, smooth boundary.

B2g—28 to 42 inches, gray (N 5/0) silty clay loam; many, medium, prominent mottles of yellowish brown (10YR 5/6 and 5/8); weak, medium, prismatic structure breaking to moderate, fine, subangular blocky; discontinuous coatings of dark-gray (2.5Y 4/1) clay on vertical ped surfaces; firm; slightly acid; gradual, smooth boundary.

C—42 to 55 inches, mixed gray (N 5/0) and yellowish-brown (10YR 5/8) silty clay loam; weak, medium, prismatic structure breaking to weak, medium, angular blocky in the upper part to massive in lower part; firm; moderately alkaline.

The A horizon varies considerably in texture because of recent flood water deposits. In many places the black surface layer is 3 feet thick or more. The B horizon ranges from 18 to 25 inches in thickness and in places is calcareous in the lower part.

Sawmill soils have a thicker surface layer than Peotone, Ashkum, or Pella soils.

Sawmill silty clay loam (107).—This soil is level or nearly level and occurs along major streams and rivers. It is frequently flooded and is very often wet for long periods of time. In some places where this soil receives sandy sediments from the uplands, the surface layer is sandy. Included in mapping were small areas of Peotone silty clay loam and small areas of Pella silty clay loam, Mundelein silt loam, and Dresden loam, all of which occur on slightly higher parts of the landscape.

Farming these soils is risky because of the flooding. Many large areas are not farmed, and many areas are farmed only occasionally. Very few areas are urban, but where there are urban areas, there is very serious damage from frequent flooding. The use of this soil is limited to recreation and wildlife habitat, unless the flooding can be controlled. (Management group IIw–3)

Saylesville Series

The Saylesville series consists of deep, nearly level to gently sloping, moderately well drained to well drained soils that formed in moderately fine textured, calcareous, glacial lakebed sediments. These soils are on uplands in many parts of the county. The native vegetation was hardwood trees.

The plow layer is dark grayish-brown, friable silt loam about 8 inches thick. Where undisturbed by plowing, the uppermost 2 inches of the surface layer is very dark grayish-brown silt loam and the lower 7 inches is brown, platy silt loam. The 37-inch subsoil is yellowish-brown to dark yellowish-brown, firm silty clay loam to silty clay in the upper part and brown, calcareous, firm silty clay loam in the lower part. The underlying material is mixed grayish-brown and yellowish-brown silty clay loam stratified with thin sandy layers.

Saylesville soils are medium acid to strongly acid. They have moderately slow permeability and high available moisture capacity. The water table is generally at least 3 feet below the surface.

Typical profile of Saylesville silt loam, 1 to 4 percent slopes, in a timbered area, 360 feet north of highway center and 96 feet east of fence line, in the northwest corner of the SE¼SW¼SE¼ sec. 13, T. 43 N., R. 10 E.

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, crumb or granular structure; friable; medium acid; abrupt, smooth boundary.

A21—2 to 6 inches, brown (10YR 5/3) silt loam; weak to moderate, thin, platy structure; friable; strongly acid; clear, smooth boundary.

A22—6 to 9 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure breaking to moderate, very fine, subangular blocky; friable; medium acid; clear, smooth boundary.

B1—9 to 14 inches, yellowish-brown (10YR 5/4) light silty clay loam; moderate, fine, subangular to angular blocky structure; firm; thin patchy coatings of light brownish-gray (10YR 6/2) silt on all ped surfaces; medium acid; clear, smooth boundary.

B21t—14 to 21 inches, dark yellowish-brown (10YR 4/4) light silty clay; moderate, very fine to fine, subangular to angular blocky structure; firm; thin continuous coatings of brown (10YR 4/3) clay on all ped surfaces; slightly acid; clear, smooth boundary.

B22t—21 to 29 inches, dark yellowish-brown (10YR 4/4) heavy silty clay loam; moderate, medium, prismatic

structure breaking to moderate, fine, subangular blocky; firm; thin continuous coatings of brown (10YR 4/3) clay on all ped surfaces; neutral; clear, smooth boundary.

B31—29 to 36 inches, brown (10YR 5/3) silty clay loam; moderate, medium, prismatic structure breaking to moderate, fine to medium, subangular blocky; firm; few, fine, faint mottles of yellowish brown (10YR 5/4) and grayish brown (10YR 5/2); thin patchy coatings of dark-brown (10YR 4/3) clay on all ped surfaces; calcareous; clear, smooth boundary.

B32—36 to 46 inches, brown (10YR 5/3) light silty clay loam; weak, medium, prismatic structure breaking to moderate, fine or medium, angular blocky; firm; many, fine, distinct mottles of grayish brown (10YR 5/2) and many, fine, faint mottles of yellowish brown (10YR 5/6); thin continuous coatings of grayish-brown (10YR 5/2) clay on the vertical surface of the peds; calcareous; clear, smooth boundary.

C—46 to 60 inches, mixed grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/6) silty clay loam in strata 3 to 4 inches thick separated by thin layers of sandy loam to sand; strong, thick, platy structure; calcareous.

The A1 and Ap horizons vary in color with variations in slope and erosion and the amount of lighter colored material that plowing has brought up from the A2 horizon. The Ap horizon is darker colored where significant amounts of organic material have been added. The B horizon ranges from 20 to 38 inches in thickness. The calcareous lakebed sediments range from 3½ to many feet in thickness.

Saylesville soils have finer textured subsoil and underlying material than Zurich soils. They are somewhat more permeable than Morley soils because they have coarser textured, less compact underlying material.

Saylesville silt loam, 1 to 4 percent slopes (370B).—This soil occurs in all parts of the county, in intermorainal areas that were once glacial lakebeds. Included in mapping were small areas of nearly level Del Rey silt loam and of Zurich soils, which are more permeable. Also included were small areas that have lakebed sediments less than 3½ feet thick.

This soil is good for cropland, and large areas are cultivated. Large areas are also in woodland and unimproved pasture. The most serious limitation is moderately slow movement of water through the soil. Slope is not a serious limitation for most uses. (Management group IIe–3)

Saylesville silt loam, 4 to 7 percent slopes, eroded (370C2).—This soil occurs in intermorainal areas that were once glacial lakebeds. The present surface layer is brown. It is a mixture of part of the subsoil and what remains of the original surface layer. Included in mapping were small areas of Saylesville silt loam, 1 to 4 percent slopes. Also included were small areas of Zurich silt loam, 4 to 7 percent slopes, eroded, and areas that have less than 3½ feet of lakebed sediments.

Most of the acreage has been cultivated, but special erosion control measures are needed in areas used for cropland. The main limitations are slope, a thin surface layer, and the severe hazard of erosion when the soil is cultivated. (Management group IVe–2)

Varna Series

The Varna series consists of deep, well drained to moderately well drained soils that formed in thin silty deposits and the underlying glacial till of silty clay loam texture. These soils are on uplands. The native vegetation was prairie grass.

The 12-inch surface layer consists of black silt loam over very dark grayish-brown silt loam. The upper part of the 23-inch subsoil consists of brown, firm silty clay loam, the middle part consists of dark yellowish-brown, firm silty clay and heavy silty clay loam, and the lower part consists of dark-brown, mottled, moderately alkaline, firm silty clay loam. The underlying material is mixed yellowish-brown and light brownish-gray, compact, firm, calcareous silty clay loam (glacial till). This material contains many pebbles and stones.

These soils are slightly acid to neutral in reaction. They have moderately slow permeability because the subsoil is somewhat clayey. The available moisture capacity is high. The water table is generally at least 3 feet below the surface.

The Varna soils in Lake County are mapped only in an undifferentiated group with Barrington soils.

Typical profile of Varna silt loam in a cropped field, 95 feet east of road center and 150 feet north of fence line, in the SE¼SE¼NW¼ sec. 5, T. 43 N., R. 11 E.

Ap—0 to 9 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; friable; neutral; abrupt, smooth boundary.

A3—9 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; slightly acid; clear, smooth boundary.

IIB21t—12 to 17 inches, brown (10YR 4/3) silty clay loam; moderate, fine to very fine, subangular blocky structure; thin coatings of clay on all ped surfaces; firm; medium acid; clear, smooth boundary.

IIB22t—17 to 22 inches, dark yellowish-brown (10YR 4/4) silty clay; weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; coatings of dark grayish-brown (10YR 4/2) clay on all ped surfaces; firm; medium acid; clear, smooth boundary.

IIB23t—22 to 27 inches, dark yellowish-brown (10YR 4/4) heavy silty clay loam; few, fine, faint mottles of yellowish brown (10YR 5/6); weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; coatings of dark grayish-brown clay on all ped surfaces; firm; slightly acid; abrupt, smooth boundary.

IIB3—27 to 35 inches, dark-brown (10YR 4/3) silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/6) and faint mottles of grayish brown (10YR 5/2); weak, medium, prismatic structure breaking to moderate, fine to medium, subangular blocky; coatings of gray (5Y 5/1) clay on vertical ped surfaces, and discontinuous coatings on horizontal ped surfaces; firm; moderately alkaline; clear, smooth boundary.

IIC1—35 to 46 inches, mixed yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) silty clay loam; weak to moderate, medium, prismatic structure breaking to moderate, medium, subangular blocky; firm; calcareous; clear, smooth boundary.

IIC2—46 to 60 inches, mixed yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) silty clay loam; weak, medium, prismatic structure to massive; firm; calcareous.

The Ap horizon ranges from black to very dark grayish brown in color. The B horizon ranges from 18 to 36 inches in thickness. The depth to carbonates ranges from 24 to 36 inches.

Varna soils have a finer textured subsoil and underlying material than Corwin soils. They have a consistently darker colored surface layer than Markham soils and a brighter colored subsoil than Elliott soils.

Wauconda Series

The Wauconda series consists of deep, level to gently sloping, somewhat poorly drained soils that formed in 2 to 3 feet of silty material and the underlying calcareous, stratified silt and sand. These soils are on uplands in all parts of the county. The native vegetation consisted of grass and hardwood trees.

In a typical profile the plow layer consists of very dark gray to black silt loam. Where undisturbed by plowing, the upper 7 inches commonly is very dark gray and the lower 2 inches is grayish brown. The upper part of the 29-inch subsoil consists of dark grayish-brown to light olive-brown, mottled, firm silty clay loam, and the lower part consists of mixed grayish-brown and yellowish-brown, calcareous silt loam. The underlying material is yellowish-brown and grayish-brown, calcareous, stratified silt and sand.

These soils are slightly acid to medium acid. They have moderate permeability and high available moisture capacity. The water table is generally 1 foot to 3 feet below the surface in spring.

Typical profile of Wauconda silt loam, 0 to 2 percent slopes, 222 feet east of fence at jog in road and 120 feet south of road center and in a clump of trees, in the NW¼ SE¼ sec. 13, T. 45 N., R. 10 E.

A1—0 to 7 inches, very dark gray (10YR 3/1) silt loam; moderate, medium, granular structure; friable; slightly acid; abrupt, smooth boundary.

A2—7 to 9 inches, grayish-brown (2.5Y 5/2) silt loam; some very dark gray (10YR 3/1) material from the A1 horizon; moderate, fine to medium, granular structure; friable; slightly acid; clear, smooth boundary.

B1t—9 to 15 inches, dark grayish-brown (10YR 4/2) light silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/4) and few, fine, faint mottles of grayish brown (2.5Y 5/2); moderate, fine, subangular blocky structure; continuous coatings of dark-gray (10YR 4/1) clay on blocks; firm; medium acid; clear, smooth boundary.

B21t—15 to 19 inches, dark grayish-brown (2.5Y 4/2) silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/4); weak, very fine, prismatic structure breaking to moderate, fine, subangular blocky; discontinuous coatings of dark-gray (10YR 4/1) clay on blocks; firm; medium acid; clear, smooth boundary.

B22t—19 to 26 inches, light olive-brown (2.5Y 5/4) silty clay loam; common, fine, distinct mottles of yellowish brown (10YR 5/6); weak, fine, prismatic structure breaking to moderate, medium, angular blocky; discontinuous coatings of dark-gray (10YR 4/1) clay on blocks; firm; slightly acid; clear, smooth boundary.

IIB3—26 to 38 inches, mixed grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6) silt loam and thin strata of fine sandy loam; weak, medium, prismatic structure breaking to moderate, medium to coarse, angular blocky; discontinuous coatings of olive-gray (5Y 5/2) clay on vertical ped surfaces; friable; calcareous; gradual, smooth boundary.

IIC—38 to 60 inches, mixed grayish-brown (2.5Y 5/2) and yellowish-brown (10YR 5/6 and 5/8), stratified silt and sand; friable; calcareous.

The A1 horizon ranges only from very dark gray to black in color because these soils have not been seriously eroded. Small areas have a coarser textured A horizon. The B horizon ranges from 18 to 30 inches in thickness. In places the C horizon contains a few thin layers of gravel.

Wauconda soils typically have a lighter colored A1 horizon than Mundelein soils and a darker colored A2 horizon than Aptakisic soils. They are somewhat more permeable than Odell silt loam and Beecher silt loam because they are coarser textured and less compact in the lower part of the subsoil and in the substratum.

Wauconda silt loam, 0 to 2 percent slopes (697A).—This soil occurs on outwash plains in all parts of the county. Included in mapping were small areas of Mundelein soil and Aptakisic silt loam, 0 to 2 percent slopes. Also included were small low areas of Pella silty clay loam, small areas of Grays silt loam, which is on higher parts of the landscape, and areas that have a surface layer of loam and a gravelly substratum.

This soil is well suited to the crops commonly grown and is used mostly for crops. For most uses other than cropland, the only limitation is the seasonal high water table. (Management group I–2)

Wauconda silt loam, 2 to 4 percent slopes (697B).—This soil is on outwash plains in all parts of the county. Included in mapping were small areas of Aptakisic silt loam and Mundelein silt loam, 2 to 4 percent slopes. Also included were small, low areas of Pella silty clay loam, small areas of Grays silt loam, which is on higher parts of the landscape, and areas that have a surface layer of loam and a gravelly substratum.

This soil is well suited to crops. The limitations are a seasonal high water table and a hazard of erosion. (Management group IIe–2)

Wauconda and Beecher silt loams, 0 to 2 percent slopes (978A).—These soils occur in intermorainal areas in all parts of the county. Some areas contain only Wauconda silt loam and some only Beecher silt loam, but most contain some of each. The Wauconda soil is the more common. The Beecher soil has finer textured subsoil and underlying material than the Wauconda soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Wauconda soil and underlying material like that of the Beecher soil. Also included in mapping were small areas of lighter colored and darker colored soils and small, low areas of Ashkum silty clay loam.

These soils are used mostly as cropland and are farmed intensively. The limitations are a seasonal high water table and moderately slow permeability in the Beecher soils. (Management group I–2)

Wauconda and Beecher silt loams, 2 to 4 percent slopes (978B).—These soils are in intermorainal areas. Some areas contain only Wauconda silt loam and some only Beecher silt loam, but most contain some of each. The Wauconda soil is the more common. The Beecher soil has a finer textured subsoil and underlying material than the Wauconda soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Wauconda soil, and underlying material of silty clay loam like that of the Beecher soil. Also included were small areas of lighter colored and darker colored soils and small low areas of Ashkum silty clay loam.

Although subject to erosion, these soils have not been seriously eroded. Most areas are farmed intensively, but some are lightly wooded and some are used as pasture. The limitations are an erosion hazard, a seasonal high water table, and moderately slow permeability in the Beecher soils. (Management group IIe–2)

Wauconda and Frankfort silt loams, 0 to 2 percent slopes (981A).—These soils are mainly in the southeastern part of the county. Some areas contain only Wauconda silt loam and some only Frankfort silt loam, but most contain some of each. The Wauconda soil is the more common. The Frankfort soil has a finer textured subsoil and underlying material than the Wauconda soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Wauconda soil and underlying material of silty clay like that of the Frankfort soil. Also included were small areas of Aptakisic and Nappanee silt loams and low areas of Montgomery silty clay.

These soils are well suited to the crops commonly grown, and the larger areas are farmed intensively. A high proportion of the acreage is near urban areas, where farming is no longer a major consideration. Because of the nearly level topography, these soils are in demand for many urban uses. The limitations are a seasonal high water table and slow movement of water through the Frankfort soils. (Management group IIw-1)

Wauconda and Frankfort silt loams, 2 to 4 percent slopes (981B).—These soils are mainly east of the Des Plaines River. Some areas contain only Wauconda silt loam and some only Frankfort silt loam, but most contain some of each. The Wauconda soil is the more common. The Frankfort soil has a finer textured subsoil and underlying material than the Wauconda soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Wauconda soil and underlying material of silty clay like that of the Frankfort soil. Also included were small areas of Aptakisic and Nappanee silt loams and low areas of Montgomery silty clay.

Some areas of these soils are farmed intensively, some are lightly wooded, and some are used as pasture. Much of the acreage is near urban areas, where farming is no longer a major consideration. The limitations are the slope, an erosion hazard, a seasonal high water table, and slow movement of water through the Frankfort soils. (Management group IIe-2)

Zurich Series

The Zurich series consists of deep, level to moderately steep, well drained to moderately well drained soils that formed in 2 to 3 feet of silty material and the underlying calcareous, stratified silt and sand. These soils are on uplands in all parts of the county. The native vegetation was hardwood trees.

In a typical profile the plow layer is dark grayish-brown silt loam. Where undisturbed by plowing, the uppermost 3 inches of the surface layer is very dark gray and the lower 6 inches is dark grayish brown. The main part of the 29-inch subsoil consists of brown to yellowish-brown, firm silt loam to silty clay loam, but the lower 10 inches consists of yellowish-brown, light brownish-gray, and grayish-brown, calcareous loam. The underlying material consists of mixed yellowish-brown, light brownish-gray, and grayish-brown, calcareous, stratified silt loam and fine sandy loam.

These soils are neutral to medium acid. They have moderate permeability and high available moisture capacity. The water table is generally at least 3 feet below the surface.

Typical profile of Zurich silt loam, 2 to 4 percent slopes, in a wooded area, 375 feet east of bridge on north side of road, in the southeast corner of SE¼SE¼SW¼ sec. 23, T. 43 N., R. 11 E.

A1—0 to 3 inches, very dark gray (10YR 3/1) silt loam; moderate, fine, granular structure; friable; neutral; clear, smooth boundary.

A2—3 to 9 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, granular structure; friable; slightly acid; clear, smooth boundary.

B1—9 to 13 inches, brown (10YR 4/3) heavy silt loam; moderate, fine, subangular blocky structure; patchy coatings of grayish-brown (10YR 5/2) silt and discontinuous coatings of dark yellowish-brown (10YR 3/4) clay on blocks; firm; medium acid; clear, smooth boundary.

B21t—13 to 20 inches, brown (7.5YR 4/3) silty clay loam and some grit; weak, fine, prismatic structure breaking to moderate, fine, subangular blocky; patchy coatings of light brownish-gray (10YR 6/2) silt and discontinuous coatings of dark yellowish-brown (10YR 3/4) clay on blocks; firm; medium acid; clear, smooth boundary.

B22t—20 to 23 inches, dark yellowish-brown (10YR 4/4) silty clay loam and some grit; weak, medium, prismatic structure to moderate, medium, subangular blocky; discontinuous coatings of dark-brown (7.5YR 4/3) clay; firm; mildly alkaline; clear, smooth boundary.

B31—23 to 28 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, medium, faint mottles of grayish brown to light grayish brown (10YR 5/2 to 6/2); weak, medium, subangular blocky structure; friable; moderately alkaline; gradual, smooth boundary.

IIB32—28 to 38 inches, mixed yellowish-brown (10YR 5/4 and 5/6), light brownish-gray (10YR 6/2), and grayish-brown (10YR 5/2) loam; weak, medium, subangular blocky structure; friable; calcareous; gradual, smooth boundary.

IIC—38 to 60 inches, mixed yellowish-brown (10YR 5/4 and 5/6), light brownish-gray (10YR 6/2), and grayish-brown (10YR 5/2), stratified silt loam and fine sandy loam; massive; friable; calcareous.

The color of the A horizon and the thickness of the B horizon vary considerably because of the variations in slope and in erosion. The B horizon ranges from 18 to 30 inches in thickness. In places the C horizon is stratified with thin layers of sand or gravel.

Zurich soils have a coarser textured lower subsoil and underlying material than Saylesville soils. When cropped, they have a somewhat lighter colored surface layer than Grays soils. Zurich soils are somewhat more permeable than Miami soils because they have a coarser textured lower subsoil and less compact underlying material.

Zurich silt loam, 0 to 2 percent slopes (696A).—This soil is on outwash plains and in intermorainal areas in all parts of the county. In a few small areas the substratum is not calcareous. Included in mapping were small areas of Aptakisic silt loam or Grays silt loam, 0 to 2 percent slopes, and areas of Zurich silt loam, 2 to 4 percent slopes. Also included were small areas of Saylesville silt loam, 1 to 4 percent slopes, and some areas that have a surface layer of loam and a gravelly substratum.

This soil is well suited to the crops commonly grown, and large areas are used for cropland. There are no serious limitations. (Management group I-1)

Zurich silt loam, 2 to 4 percent slopes (696B).—This soil is on outwash plains in all parts of the county. Included in mapping were small areas of Grays silt loam, 2

to 4 percent slopes, and areas of Zurich silt loam, 0 to 2 percent slopes. Also included were small areas of Saylesville silt loam, 1 to 4 percent slopes, and some areas that have a surface layer of loam and a gravelly substratum.

This soil is suited to the crops commonly grown. The slope and an erosion hazard are moderate limitations. (Management group IIe-1)

Zurich silt loam, 4 to 7 percent slopes (696C).—This soil occurs in outwash areas of the county. Included in mapping were small areas of Grays silt loam, of Zurich silt loam, 2 to 4 percent slopes, and of Zurich silt loam, 4 to 7 percent slopes, eroded. Also included were small areas of Saylesville silt loam, 4 to 7 percent slopes, eroded, and areas that have a surface layer of loam and a gravelly substratum.

This soil is mainly in trees or in unimproved pasture. The major limitations are the slope and the even greater slope of associated soils. (Management group IIe-1)

Zurich silt loam, 4 to 7 percent slopes, eroded (696C2).—This soil occurs in outwash areas of the county. The present surface layer is brown. It is a mixture of part of the subsoil and what is left of the original surface layer. Included in mapping were small areas of Zurich silt loam, 4 to 7 percent slopes, and of Zurich silt loam, 2 to 4 percent slopes. Also included were small areas of Zurich silt loam, 7 to 15 percent slopes, eroded, and areas that have a surface layer of loam and a gravelly substratum.

Most of the acreage is or has been cultivated. Special erosion control measures are needed in farmed areas. The main limitations are the slope and the thinness of the surface layer. Runoff is rapid and erosion is a severe hazard when the soil is cultivated. (Management group IIIe-1)

Zurich silt loam, 7 to 15 percent slopes, eroded (696D2).—This soil is in outwash areas of the county. The present surface layer is brown. It is a mixture of part of the subsoil and what remains of the original surface layer. Included in mapping were small areas of uneroded Zurich silt loam, small areas of Hennepin loam, 15 to 30 percent slopes, and areas that have a surface layer of loam and a gravelly substratum.

A large proportion of the acreage is or has been cultivated. Special erosion control measures are needed in areas used for cropland. The limitations are a severe erosion hazard and, in unprotected areas, rapid runoff. (Management group IVe-2)

Zurich and Morley silt loams, 2 to 4 percent slopes (980B).—These soils occur in morainal areas in all parts of the county. Some areas contain only Zurich silt loam and some only Morley silt loam, but most contain some of each. The Zurich soil is the more common. The Morley soil has a finer textured subsoil and underlying material than the Zurich soils. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Zurich soil and underlying material of silty clay loam like that of the Morley soil. Also included were small eroded areas and small, lower areas of Wauconda and Beecher silt loams, 2 to 4 percent slopes.

These soils are only slightly eroded. Many areas are wooded or have not been farmed intensively. The limitations are an erosion hazard and moderately slow movement of water through the Morley soils. For most uses, slope is not a serious limitation. (Management group IIe-1)

352-871—70——4

Zurich and Morley silt loams, 4 to 7 percent slopes, eroded (980C2).—These soils are in morainal areas of the county. The present surface layer is brown. It is a mixture of part of the subsoil and what remains of the original surface layer. Some areas contain only Zurich silt loam and some only Morley silt loam, but most contain some of each. The Zurich soil is the more common. The Morley soil has a finer textured subsoil and underlying material than the Zurich soil. Included in mapping were areas of soils that have a surface layer of silt loam and a subsoil of silty clay loam like those of the Zurich soil and underlying material of silty clay loam like that of the Morley soil. Also included were small areas of Zurich and Morley silt loams, 2 to 4 percent.

Most of the acreage is or has been cultivated. Special erosion control measures are needed if crops are grown. The limitations are the erosion hazard and the moderately slow movement of water through the Morley soils. When the soil is bare, runoff is rapid and erosion is severe. (Management group IIIe-1)

Zurich and Nappanee silt loams, 2 to 4 percent slopes (983B).—These soils are in intermorainal areas of the county. Some areas contain only Zurich silt loam and some only Nappanee silt loam, but most contain some of each. The Zurich soil is the more common. Zurich silt loam is moderately well drained to well drained and Nappanee silt loam is somewhat poorly drained. The Nappanee soil has a finer textured subsoil and underlying material than the Zurich soil. Included in mapping were areas of a soil that has a surface layer and a subsoil similar to those of the Zurich soil and underlying material similar to that of the Nappanee soil. Also included were small eroded areas and small, low areas of Wauconda and Frankfort silt loams, 2 to 4 percent slopes, which are darker colored.

These soils are only slightly eroded. A large proportion of the acreage is wooded or has not been farmed intensively. The most serious limitation is slow movement of water through the Nappanee soils. For most uses, slope is not a serious limitation. (Management group IIe-1)

Use and Management of the Soils

This section explains the system of capability grouping used by the Soil Conservation Service and discusses the management of the soils in Lake County by management groups. Estimated yields of the principal crops are given. The properties and features affecting engineering are enumerated, mainly in tables. Also discussed are management of wildlife habitat, woodland, tree plantings, shrub and vine plantings, and recreational facilities.

Capability Grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The group-

ing does not take into account major and generally expensive land-forming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to horticultural crops or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for recreation, for forest trees, or engineering.

In the capability system, all kinds of soils are grouped at three levels: the capability class, the subclass, and the unit or management group. These are discussed in the following paragraphs.

Capability Classes, the broadest grouping, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, defined as follows:

- Class I soils have few limitations that restrict their use.
- Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.
- Class III soils have severe limitations that reduce the choice of plants, require special conservation practices, or both.
- Class IV soils have very severe limitations that reduce the choice of plants, require very careful management, or both.
- Class V soils are not likely to erode but have other limitations, impractical to remove, that limit their use largely to pasture, woodland, or wildlife. (There are no class V soils in Lake County.)
- Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland, or wildlife.
- Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture, woodland, or wildlife.
- Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, or water supply, or to esthetic purposes.

Capability Subclasses are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIw. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used only in some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in it are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, woodland, wildlife, or recreation.

Management Groups are soil groups within the subclasses. The soils in one management group are enough alike to be suited to the same crops and pasture plants, to require similar management, and to be similar in productivity and other responses to management. Thus, the management group is a convenient grouping for making many statements about the management of soils. A management group is generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe-4 or IIIw-2. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in a foregoing paragraph; and the Arabic numeral identifies the management group within the subclass.

Management by Groups of Soils

In the following pages each of the management groups in Lake County is described, and suggestions for use and management of the soils in each group are given. The names of the soil series represented are mentioned in the description of each unit, but this does not mean that all the soils in a given series are in the unit. The management classification of each individual soil is given in the "Guide to Mapping Units." Borrow area, Made land, and Gravel pits are not in a management group.

Management group I-1

This group consists of deep, nearly level, moderately well drained to well drained, silty soils on uplands. These soils are members of the Barrington, Corwin, Grays, Markham, and Zurich series. They have moderate to moderately slow permeability and high available moisture capacity. They have high natural fertility and are naturally slightly acid to medium acid. The supply of available phosphorus is low to medium, and that of available potassium is generally high. Moderate to heavy applications of nitrogen are needed. Erosion is not a serious hazard.

The soils in this group are well suited to corn, soybeans, and small grain. They are seldom used for hay and pasture. Row crops can be grown intensively.

Management group I-2

This group consists of deep, nearly level, somewhat poorly drained, silty soils on uplands. These soils are members of the Beecher, Elliott, Mundelein, Odell, and Wauconda series. They have moderate to moderately slow permeability and high available moisture capacity. They have high natural fertility and are slightly acid to medium acid. The supply of available phosphorus is medium, and that of available potassium is generally high. Moderate to heavy applications of nitrogen are needed. Erosion is not a serious hazard.

The soils in this group are well suited to corn, soybeans, small grain, hay, and pasture, but they are seldom used for hay and pasture. Row crops can be grown intensively.

Some areas of these soils need artificial drainage. Tile drainage is commonly used.

Management group IIe–1

This group consists of deep, gently sloping to moderately sloping, moderately well drained to well drained, silty soils on uplands. These soils occur on ridges and generally have short, irregular slopes. They are members of the Barrington, Corwin, Grays, Markham, Miami, Montmorenci, Morley, Nappanee, Varna, and Zurich series. Except for Nappanee soils, all of these soils have moderate to moderately slow permeability and high available moisture capacity. Nappanee soils have slow permeability and moderate available moisture capacity. Natural fertility is medium to high, and reaction is slightly acid to strongly acid. The supply of available phosphorus is low to medium, and that of available potassium is generally high. Heavy applications of nitrogen are needed.

The soils in this group are well suited to corn, soybeans, and small grain and to grass and legumes grown for hay and pasture. Row crops can be grown intensively if erosion is controlled.

Contouring and other conservation practices are difficult to establish in many areas because of the slope. Erosion can be controlled in these areas by using a rotation that includes grass and legumes more of the time, by keeping tillage to a minimum, and by maintaining a cover of growing vegetation or mulch as much of the time as possible.

Management group IIe–2

This group consists of deep, gently sloping, somewhat poorly drained, silty soils on uplands. These soils are members of the Beecher, Del Rey, Elliott, Frankfort, Martinton, Mundelein, Odell, and Wauconda series. They have moderate to slow permeability and high available moisture capacity. They have medium to high natural fertility and are naturally slightly acid to strongly acid. The supply of available phosphorus is low to medium, and that of available potassium is generally high. Moderate to heavy applications of nitrogen are needed. Erosion is a hazard.

The Beecher, Del Rey, Elliott, Frankfort, and Martinton soils have a finer textured subsoil and substratum than the other soils in this group.

The soils in this group are well suited to corn, soybeans, small grain, hay, and pasture, but they are seldom used for hay and pasture. Row crops can be grown intensively if erosion is controlled.

Grassed waterways or tile are needed where these soils occur in natural drainageways or at the base of slopes.

Management group IIe–3

This group consists of deep, gently sloping, moderately well drained to well drained, silty soils on uplands. These soils are members of the Markham, Morley, and Saylesville series. They have moderately slow permeability and high available moisture capacity. They have medium natural fertility and are strongly acid to medium acid. Erosion is a slight hazard. The supply of available phosphorus is low to medium, and that of available potassium is generally high. Crops respond well to applications of lime and fertilizer.

The soils in this group are suited to corn, soybeans, small grain, and other cultivated crops. They are also well suited to grass and legumes grown for hay or pasture.

The control of erosion can be a problem in areas that are intensively cultivated. Winter cover crops, green-manure crops, and crop residue help to maintain organic-matter content and good soil tilth. Combined with minimum tillage, contour cultivation, or other erosion control practices, they help to reduce runoff and loss of soil.

Management group IIe–4

This group consists of gently sloping, moderately well drained to well drained, loamy soils on uplands. These soils are moderately deep over gravelly and sandy material. They are members of the Dresden and Fox series. They have moderate permeability in the surface layer and subsoil and rapid permeability in the underlying material. They have moderate available moisture capacity. They have medium natural fertility and are naturally medium acid to strongly acid. The supply of available phosphorus is low, and that of available potassium is generally medium. Heavy applications are needed.

The soils in this group are suited to all the crops grown, but some crops are damaged by drought in some years.

The control of wind and water erosion is a problem when the soils are bare. The practices that control erosion most effectively are the maintenance of a good cover of vegetation as much of the time as possible and the use of crop residue. Practices to help control erosion and conserve moisture are needed in some places.

Management group IIw–1

This group consists of deep, nearly level to gently sloping, silty soils on uplands. These soils have a subsoil of silty clay in some places but of silty clay loam in other places. They are members of the Aptakisic, Beecher, Del Rey, Elliott, Frankfort, Martinton, Nappanee, and Wauconda series. They have moderate to slow permeability and moderate to high available moisture capacity. They have medium natural fertility and are medium acid to strongly acid. The supply of available phosphorus is low to medium, and that of available potassium is generally high. Heavy applications of nitrogen are needed. Erosion is a hazard in gently sloping areas.

The soils in this group are suited to corn, soybeans, small grain, and other cultivated crops and to grass and legumes grown for hay and pasture. Row crops can be grown intensively if erosion is controlled and drainage is improved.

The control of erosion is not a serious problem. Drainage is needed. Subsurface tile or open ditches can be used.

Management group IIw–2

This group consists of deep, level, poorly drained soils in low positions. Typically, they have a surface layer and subsoil of silty clay loam. These soils are members of the Ashkum, Harpster, and Pella series. They have a high water table and are subject to ponding. They have high natural fertility, moderate to moderately slow permeability, and high available moisture capacity. They are not likely to erode. Except in Harpster soils, the supply of available potassium generally is high and that of available phosphorus is medium. Moderate applications of

nitrogen are needed. The Pella and Ashkum soils are neutral in reaction; the Harpster soils are calcareous.

The soils in this group are well suited to corn and soybeans. They are seldom used for small grain, hay, or pasture. Row crops can be grown intensively.

Artificial drainage is needed because of the high water table and ponding. Subsurface tile or open ditches can be used.

Management group IIw-3

This group consists of deep, level soils in depressions on uplands and on flood plains. Typically, these soils have a surface layer and subsoil of silty clay loam. They are members of the Peotone and Sawmill series. They are subject to flooding and to ponding. They have moderate to moderately slow permeability and high available moisture capacity. They have high natural fertility and are neutral in reaction. The supply of available phosphorus is medium, and that of available potassium is generally high. Moderate applications of nitrogen are needed.

The soils in this group are well suited to corn and soybeans. If the wetness hazard is too severe for row crops, they are used for pasture, but they are seldom used for small grain and hay. Corn and soybeans can be grown almost continuously.

The Peotone soils can be drained if outlets can be established. Either tile or open ditches can be used. Sawmill soils should be protected from flooding.

Management group IIs-1

This group consists of nearly level to gently sloping, well-drained, loamy soils of the uplands. These soils are moderately deep over sand and gravel. They are members of the Boyer, Dresden, and Fox series. They have moderate permeability in the subsoil and rapid permeability in the underlying material and low to moderate available moisture capacity. They have low to medium natural fertility and are naturally medium acid to strongly acid. The supply of available phosphorus is low, and that of available potassium is generally low to medium. Heavy applications of nitrogen and organic matter are needed.

The soils in this group are suited to small grain. Suitability for other crops is limited by the low to moderate available moisture capacity.

Management group IIIe-1

This group consists of deep, gently sloping to strongly sloping, moderately well drained to well drained, silty soils on uplands. These soils are members of the Markham, Miami, Montmorenci, Morley, and Zurich series. They have moderate to moderately slow permeability and high available moisture capacity. They have low to medium natural fertility and are slightly acid to strongly acid. The supply of available phosphorus is low to medium, and that of available potassium is generally high. Heavy applications of nitrogen and organic matter are needed. Erosion is a hazard.

If management is intensive, the soils in this group are suited to cultivated crops, hay, and pasture (fig. 8).

The control of erosion is the main problem. Grass and legumes should be grown frequently in the rotation. In many areas contouring and terracing for control of erosion are not practical. Tillage should be kept to a minimum, and a cover of growing vegetation or mulch should be kept on the surface as much of the time as possible.

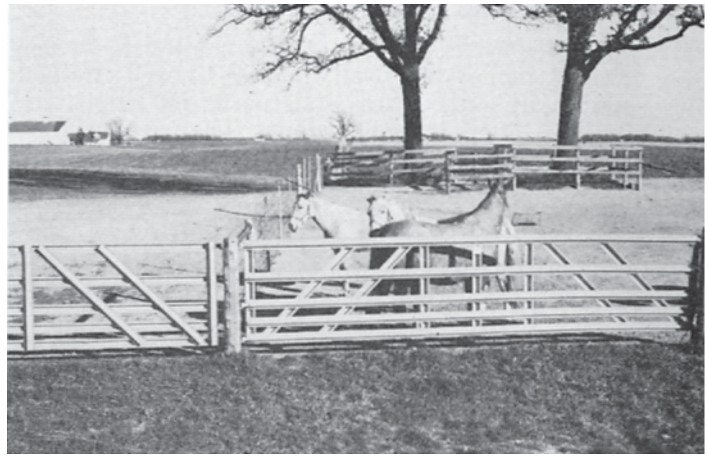

Figure 8.—Productive pasture on Morley silt loam. The horses are Lippizzaners raised on this farm.

Management group IIIe-2

This group consists of gently sloping, moderately wet soils on uplands. These soils have a silty surface layer and a clayey subsoil. They are members of the Frankfort and Nappanee series. They have slow permeability and moderate to high available moisture capacity. They have low to medium natural fertility and are naturally medium acid. The supply of available phosphorus is low and that of available potassium is high. Heavy applications of nitrogen are needed. Erosion is a hazard.

The soils in this group are suited to cultivated crops, meadow, and pasture.

The suitability of these soils for cultivated crops is limited by wetness in spring, by low fertility, especially in the Nappanee soil, by the erosion hazard, and by lack of available moisture in some years. Erosion control and surface drainage are needed. Tile do not function properly. If deep-rooted crops are grown, lime is needed. All crop residue should be returned to the soil.

Management group IIIw-1

This group consists of nearly level soils on uplands. These soils have a silty surface layer and a clayey subsoil. They are members of the Frankfort and Nappanee series. They have slow permeability. They have moderate to high available moisture capacity, but often become dry during the growing season. They have low fertility and are medium acid. The supply of available phosphorus is low, and that of available potassium is high.

The soils in this group are suitable for cultivated crops, meadow, and pasture.

The control of wetness and the improvement of fertility are major problems. Since tile do not function properly, surface drains are generally used to remove excess water. Crops respond well to regular, heavy applications of nitrogen. For deep-rooted crops, lime is needed. Crops are sometimes damaged by lack of moisture during the growing season. All crop residue should be returned to the soil. The control of erosion is not a serious problem.

Management group IIIw-2

This group consists of Granby loamy fine sand, which has low available moisture capacity and low natural fertility. This soil occurs near the Lake Michigan beaches, where no crops are grown. Consequently, no management interpretations are provided.

Management group IIIw-3

This group consists of Montgomery silty clay, a deep, level, poorly drained soil that occurs in low positions. This soil has a high water table and is subject to ponding. It has slow permeability and high available moisture capacity. It has high natural fertility and is neutral in reaction. The supply of available phosphorus is medium and that of available potassium is high. Moderate applications of nitrogen are needed.

This soil is suited to corn and soybeans. It is seldom used for small grain or hay. Areas too wet for row crops are used for pasture. If adequate drainage is provided, corn and soybeans can be grown often.

Suitable drainage outlets are hard to find, and tile do not function satisfactorily because of the fine texture and the slow permeability. In the lowest areas, crops can be planted only occasionally, generally when there is dry weather in spring, and even then crops are likely to be damaged by flooding during the growing season.

Management group IIIw-4

This group consists of Houghton muck, a deep, level, organic soil in depressions. This soil receives water from the surrounding uplands and is subject to ponding. It has variable permeability and very high available moisture capacity. It has somewhat low natural fertility and is neutral in reaction. The supply of available phosphorus and potassium is low, and the supply of trace elements is sometimes deficient. Only small applications of nitrogen are needed.

If artificially drained, this soil is well suited to corn, soybeans, and vegetables. It is seldom used for small grain and hay. Small areas surrounded by rolling topography and areas too wet for row crops are used for pasture.

The main problems are control of ponding and maintenance of drainage systems and outlets. Intensive farming is possible if management is good. Overdrainage can result in a hazard of wind erosion or of fire. Many areas have been burned at one time or another.

Management group IVe-1

This group consists of moderately sloping to strongly sloping, moderately well drained to well drained, loamy soils on uplands. These soils are moderately deep over sand and gravel. They are members of the Boyer and Fox series. They have moderate permeability in the subsoil and rapid permeability in the underlying material. They have moderate to low available moisture capacity. They have medium to low natural fertility. Erosion is a hazard.

These soils can be used occasionally for a crop that requires cultivation, but they are better suited to meadow and pasture.

The control of erosion is a major problem. For many areas, terracing and other conservation practices are not practical. Frequent moderate applications of fertilizer are more effective than occasional larger applications, because of the moderately rapid to rapid permeability.

Management group IVe-2

This group consists of deep, moderately sloping to strongly sloping, somewhat poorly drained to well-drained, silty soils on uplands. These soils are members of the Markham, Miami, Morley, Nappanee, Saylesville, and Zurich series. They have moderate to slow permeability and moderate to high available moisture capacity. They have low natural fertility.

These soils can be used occasionally for a crop that requires cultivation, but they are better suited to hay or pasture. Areas still covered with trees should not be cleared.

The control of erosion is the main problem. For many areas, terracing and other conservation practices are not practical, because of the irregular topography.

Management group VIe-1

This group consists of deep, moderately well drained to well drained, loamy and silty soils on uplands. These soils are members of the Casco, Hennepin, and Morley series. They have moderate to moderately slow permeability in the subsoil. Casco soils have rapid permeability below the subsoil. The Hennepin and Morley soils have high available moisture capacity, and the Casco soils have low available moisture capacity. Natural fertility is low. Erosion of areas unprotected by vegetation is a hazard.

These soils are suited to hay, pasture, trees, and other permanent vegetation.

Control of erosion is the main problem. Overgrazing of pastures should be prevented, and grazing of wooded areas should not be permitted.

Management group VIIe-1

This group consists of well-drained, loamy and silty soils on uplands. These soils are members of the Hennepin and Morley series. They have high available moisture capacity and low natural fertility. Erosion of areas not protected by vegetation is a hazard.

The soils in this group are suited to pasture, trees, and other permanent vegetation. Areas covered with trees should not be cleared.

Control of erosion is the main problem. Grazing of open pastures should be controlled, and grazing of wooded areas should not be permitted.

Management group VIIw-1

This group consists of Peotone silty clay loam, wet, a marshy soil that is wet the entire year and, for the most part, cannot be drained.

At present this soil is suitable for pond sites and as a habitat for wetland wildlife.

Management group VIIs-1

This group consists of excessively drained, sandy to loamy soils. These soils are members of the Plainfield and Rodman series. They have rapid permeability and very low available moisture capacity. Natural fertility is very low. Wind erosion is a hazard.

Plainfield soils are ordinarily in capability subclass IVs, but those in Lake County are not farmed, because they are within Illinois Beach State Park; consequently, they have been placed in capability subclass VIIs.

The soils in this group are suitable for recreational areas and for wildlife habitat.

Management group VIIIw–1

This group consists of wet Houghton soils and Marsh. These soils are saturated most of the time and cannot be drained. Their use is restricted to recreation, wildlife, and water supply. Commercial production of plants is precluded by the wetness.

Management group VIIIs–1

This group consists of Beach sand, a land type that occurs along Lake Michigan the entire length of the county. Beach sand is constantly shifting and is changed nearly every year by the action of waves.

This land type is not suitable for the commercial production of plants. Its use is restricted to recreation and esthetic purposes.

Estimated Yields

Table 5 gives estimates of average acre yields of the principal crops in Lake County under two levels of management. These estimates represent a period long enough to include the usual range in weather conditions. They are based on current information and can be expected to change with improvements in farming techniques, crop varieties, and soil management. Annual crop yields for a specific soil and management level may range from about 20 percent above to 20 percent below the averages shown in table 5.

In columns A are estimates of yields to be expected under average management; they are averages for all the farms in the county and all kinds of management over a 10-year period. In columns B are estimates of yields to be expected under high-level management; they represent approximately 90 percent of the longtime average yields obtained from experimental plots managed to obtain near maximum production. In evaluating farmland for most purposes, the estimates in columns A are probably a better guide than those in columns B.

Under average management, lime and fertilizer are used but often not in adequate amounts or not in proper balance for optimum yields; drainage is improved and erosion controlled, but more intensive measures are needed; the cropping system and the plant population are not such as to produce optimum yields; the organic-matter content and the physical condition of the soil are less than optimum; tillage and control of weeds, diseases, and insects are sometimes inadequate; seed selected is not always the variety best adapted; application of practices could be more timely, and the combination of practices could be better.

Under high-level management, the cultural practices, fertilization practices, and drainage improvements are optimum for the crop, the soil, and the climate. Irrigation is not included. If corn is grown, fertilizer is applied according to the results of soil tests; crop residue and manure are utilized; and tillage and traffic are kept to a minimum in order to protect the soil structure.

Plantings for Wildlife Habitat [3]

The soils in Lake County have been placed in six wildlife groups according to their capacity to provide food and cover for the wild birds and animals most common in the county. Table 6 contains brief descriptions of these groups and shows for which kinds of wildlife the soils of each group provide habitat and what grains, grasses, and legumes that would improve the habitat are suitable for planting. The names of the soil series represented in each group are listed, but this does not necessarily mean that all the soils of these series are in the given group. The wildlife group classification of each soil is given in the "Guide to Mapping Units." Beach sand, Borrow area, Gravel pits, and Made land are not in wildlife groups.

Engineering Uses of the Soils

Some soil properties are of particular interest to engineers, because they affect the construction and maintenance of roads, airports, pipelines, building foundations, facilities for water storage, erosion control structures, irrigation and drainage systems, and sewage disposal characteristics, drainage, shrink-swell characteristics, dispersion, grain size, plasticity, and reaction. Depth to the water table, depth to bedrock, available water capacity, and topography are also important. Estimates of the soil properties significant in engineering are given in table 7, and the interpretations relating to engineering uses of the soils are shown in table 8. See pages 50 through 67.

The information in this section can be used to—

1. Make preliminary estimates of soil properties that are significant in the planning of agricultural drainage systems, farm ponds, irrigation systems, and diversion terraces.
2. Make preliminary evaluations that will aid in selecting locations for highways, airports, pipelines, and cables and in planning detailed investigations of the selected locations.
3. Locate probable sources of sand, gravel, or other construction materials.
4. Make studies that will aid in selecting and developing industrial, business, residential, and recreational sites and in preserving green belts or open spaces for cropland and other farm use.
5. Correlate performance of engineering structures with soil mapping units to develop information for overall planning that will be useful in designing and maintaining engineering structures.
6. Determine the suitability of soils for cross-country movement of vehicles and construction equipment.
7. Supplement the information obtained from other published maps and reports and aerial photographs to make maps and reports that can be used readily by engineers.
8. Develop other preliminary estimates for construction purposes pertinent to the particular area.

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[3] Developed with assistance of REX HAMILTON, biologist, ROBERT LAWSON, agronomy specialist, and VIRGIL HAWK, plant materials specialist, Soil Conservation Service.

TABLE 5.—*Estimated average acre yields of principal crops under two levels of management*

[Yields in columns A are those to be expected under average management; yields in columns B are those to be expected under high-level management. Dashes indicate that the crop is not well suited to the soil or that it is not commonly grown]

Soil	Corn		Soybeans		Wheat		Oats		Alfalfa-grass hay		Alfalfa-grass pasture	
	A	B	A	B	A	B	A	B	A	B	A	B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*A.U.D.*[1]	*A.U.D.*[1]
Aptakisic silt loam	60	93	25	34	27	41	44	67	2.5	4.2	125	215
Aptakisic and Nappanee silt loams, 0 to 2 percent slopes	54	80	22	31	25	35	39	58	2.2	3.4	105	175
Aptakisic and Nappanee silt loams, 2 to 4 percent slopes	52	80	22	31	25	35	38	58	2.1	3.4	100	175
Ashkum silty clay loam	75	91	30	33	33	40	55	66	3.2	4.1	160	210
Barrington silt loam, 0 to 2 percent slopes	76	98	30	35	34	44	56	71	3.2	4.6	165	230
Barrington silt loam, 2 to 4 percent slopes	74	97	29	35	33	43	54	70	3.1	4.5	160	225
Barrington and Varna silt loams, 2 to 4 percent slopes	71	93	28	34	32	41	52	67	3.0	4.2	150	215
Beach sand	--	--	--	--	--	--	--	--	--	--	--	--
Beecher silt loam, 0 to 2 percent slopes	64	88	26	33	29	39	47	64	2.6	4.0	130	200
Beecher silt loam, 2 to 4 percent slopes	63	88	25	33	28	39	46	64	2.6	4.0	125	200
Borrow area	--	--	--	--	--	--	--	--	--	--	--	--
Boyer sandy loam, 1 to 4 percent slopes	44	68	19	27	22	30	33	49	1.7	2.8	80	140
Boyer sandy loam, 4 to 10 percent slopes, eroded	38	63	17	25	21	28	31	46	1.4	2.6	65	125
Casco loam, 3 to 10 percent slopes, eroded	45	65	20	26	23	29	35	48	2.0	2.7	85	130
Corwin silt loam, 0 to 2 percent slopes	75	93	30	34	33	41	55	67	3.2	4.2	160	215
Corwin silt loam, 2 to 4 percent slopes	74	93	30	34	33	41	55	67	3.1	4.2	160	215
Del Rey silt loam, 0 to 2 percent slopes	63	88	25	33	28	39	46	66	2.6	4.0	125	200
Del Rey silt loam, 2 to 4 percent slopes	58	86	24	30	28	39	44	64	2.4	3.8	120	195
Dresden loam, 0 to 2 percent slopes	71	91	28	33	32	40	52	66	3.0	4.1	150	210
Dresden loam, 2 to 4 percent slopes	68	85	27	32	30	37	50	61	2.8	3.7	140	190
Elliott silt loam, 0 to 2 percent slopes	68	93	27	34	30	41	50	67	2.8	4.2	140	215
Elliott silt loam, 2 to 4 percent slopes	65	91	26	33	29	40	48	66	2.7	4.1	135	210
Fox loam, 0 to 2 percent slopes	59	85	24	32	27	37	43	61	2.4	3.7	120	190
Fox loam, 2 to 4 percent slopes	58	80	24	31	27	35	42	58	2.4	3.4	115	175
Fox loam, 4 to 7 percent slopes, eroded	55	78	23	31	26	34	41	57	2.3	3.3	110	170
Fox loam, 7 to 12 percent slopes, eroded	54	75	22	30	25	33	38	55	2.2	3.2	105	160
Frankfort silt loam, 0 to 2 percent slopes	57	78	24	31	26	34	42	57	2.3	3.3	115	170
Frankfort silt loam, 2 to 4 percent slopes	55	78	23	31	26	34	41	57	2.3	3.3	110	170
Granby loamy fine sand	55	80	23	31	26	35	41	58	2.3	3.4	110	175
Gravel pits	--	--	--	--	--	--	--	--	--	--	--	--
Grays silt loam, 0 to 2 percent slopes	68	95	27	34	30	42	50	68	2.8	4.4	140	220
Grays silt loam, 2 to 4 percent slopes	65	93	26	34	29	41	48	67	2.7	4.2	135	215
Grays and Markham silt loams, 0 to 2 percent slopes	72	88	28	33	32	49	53	64	4.0	4.0	150	200
Grays and Markham silt loams, 2 to 4 percent slopes	71	87	28	32	32	38	52	63	3.0	3.8	150	195
Harpster silty clay loam	75	91	30	33	33	40	55	66	3.2	4.1	160	210
Hennepin loam, 15 to 30 percent slopes	--	--	--	--	--	--	--	--	--	--	--	--
Hennepin loam, 30 to 60 percent slopes	--	--	--	--	--	--	--	--	--	--	--	--
Houghton muck	68	97	27	35	--	--	--	--	--	--	--	--
Houghton muck, wet	--	--	--	--	--	--	--	--	--	--	--	--
Houghton peat, wet	--	--	--	--	--	--	--	--	--	--	--	--
Made land	--	--	--	--	--	--	--	--	--	--	--	--
Markham silt loam, 1 to 4 percent slopes	55	87	23	32	26	38	41	63	2.3	3.8	110	195
Markham silt loam, 2 to 4 percent slopes, eroded	52	85	22	32	25	37	38	61	2.1	3.7	100	190
Markham silt loam 4 to 7 percent slopes	50	83	21	32	24	36	37	60	2.0	3.6	95	180
Markham silt loam, 4 to 7 percent slopes, eroded	47	78	20	31	23	34	36	57	1.8	3.3	90	170
Markham silt loam, 7 to 12 percent slopes, eroded	44	75	19	30	22	33	33	55	1.7	3.2	80	160
Marsh	--	--	--	--	--	--	--	--	--	--	--	--
Martinton silt loam, 0 to 2 percent slopes	71	93	28	34	32	41	52	67	3.0	4.2	150	215
Martinton silt loam, 2 to 4 percent slopes	68	91	27	33	30	40	50	66	2.8	4.1	140	210
Miami silt loam, 2 to 4 percent slopes	61	88	25	33	28	39	45	64	2.5	4.0	125	200
Miami silt loam, 4 to 7 percent slopes	55	85	23	32	26	37	39	61	2.2	3.7	105	190
Miami silt loam, 4 to 7 percent slopes, eroded	47	80	20	31	23	35	36	58	1.8	3.4	90	175
Miami silt loam, 7 to 12 percent slopes	45	80	19	31	23	35	34	58	1.7	3.4	85	175
Miami silt loam, 7 to 12 percent slopes, eroded	42	75	19	30	22	33	32	55	1.6	3.2	75	160
Montgomery silty clay	73	87	29	32	32	38	54	63	3.0	3.8	155	195
Montmorenci silt loam, 2 to 4 percent slopes	65	91	26	33	29	40	48	66	2.7	4.1	135	210
Montmorenci silt loam, 4 to 7 percent slopes, eroded	55	83	23	32	26	36	41	60	2.3	3.6	110	180
Morley silt loam, 2 to 4 percent slopes	52	78	22	31	25	34	38	57	2.1	3.3	110	170
Morley silt loam, 2 to 4 percent slopes, eroded	47	78	20	31	23	34	36	57	1.8	3.3	90	170
Morley silt loam, 4 to 7 percent slopes	47	78	20	31	23	34	36	57	1.8	3.3	90	170

See footnote at end of table.

TABLE 5.—*Estimated average acre yields of principal crops under two levels of management*—Continued

Soil	Corn A	Corn B	Soybeans A	Soybeans B	Wheat A	Wheat B	Oats A	Oats B	Alfalfa-grass hay A	Alfalfa-grass hay B	Alfalfa-grass pasture A	Alfalfa-grass pasture B
	Bu.	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Bu.*	*Tons*	*Tons*	*A.U.D.*[1]	*A.U.D.*[1]
Morley silt loam, 4 to 7 percent slopes, eroded	44	71	19	28	22	32	33	52	1.7	3.0	80	150
Morley silt loam, 7 to 12 percent slopes	44	71	19	28	22	32	33	52	1.7	3.0	80	150
Morley silt loam, 7 to 12 percent slopes, eroded	42	68	19	27	22	30	32	50	1.6	2.8	75	140
Morley silt loam, 12 to 25 percent slopes	42	68	19	27	22	31	32	50	1.6	2.8	75	140
Morley silt loam, 12 to 25 percent slopes, eroded	35	65	17	26	20	29	30	48	1.3	2.7	60	135
Mundelein silt loam, 0 to 2 percent slopes	78	100	31	36	34	45	57	72	3.3	4.8	170	240
Mundelein silt loam, 2 to 4 percent slopes	75	98	30	35	33	44	55	71	3.2	4.6	160	230
Mundelein and Elliott silt loams, 0 to 2 percent slopes	76	98	30	35	34	44	56	71	3.2	4.6	165	230
Mundelein and Elliott silt loams, 2 to 4 percent slopes	75	97	30	35	33	43	55	70	3.2	4.5	160	225
Nappanee silt loam, 0 to 2 percent slopes	50	75	21	30	24	33	37	55	2.0	3.2	95	160
Nappanee silt loam, 2 to 4 percent slopes	49	75	21	30	24	33	37	55	1.9	3.1	95	155
Nappanee silt loam, 4 to 7 percent slopes, eroded	35	71	17	28	20	32	30	52	1.3	3.0	70	140
Odell silt loam, 0 to 2 percent slopes	76	93	30	34	33	41	55	67	3.2	4.2	165	215
Odell silt loam, 2 to 4 percent slopes	75	93	30	34	33	41	55	67	3.2	4.2	160	215
Pella silty clay loam	83	98	32	35	36	44	60	71	3.6	4.6	180	230
Peotone silty clay loam	71	88	28	33	32	39	52	64	3.0	4.0	150	200
Peotone silty clay loam, wet	------	------	------	------	------	------	------	------	------	------	------	------
Plainfield sand, slightly acid variant, 1 to 4 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Rodman gravelly loam, 15 to 50 percent slopes	------	------	------	------	------	------	------	------	------	------	------	------
Sawmill silty clay loam	75	95	30	34	33	42	55	68	3.2	4.4	70	220
Saylesville silt loam, 1 to 4 percent slopes	55	83	23	32	26	36	41	60	2.3	3.6	110	180
Saylesville silt loam, 4 to 7 percent slopes, eroded	47	73	20	29	23	32	36	54	1.8	3.1	90	155
Wauconda silt loam, 0 to 2 percent slopes	71	97	28	35	32	43	52	70	3.0	4.5	150	225
Wauconda silt loam, 2 to 4 percent slopes	70	97	28	35	31	43	51	70	2.9	4.5	145	225
Wauconda and Beecher silt loams, 0 to 2 percent slopes	68	93	27	34	30	41	50	67	2.8	4.2	140	215
Wauconda and Beecher silt loams, 2 to 4 percent slopes	67	93	26	34	30	41	49	67	2.7	4.2	140	215
Wauconda and Frankfort silt loams, 0 to 2 percent slopes	65	93	26	34	29	41	48	67	2.7	4.2	135	215
Wauconda and Frankfort silt loams, 2 to 4 percent slopes	64	93	26	34	29	41	47	67	2.6	4.2	135	215
Zurich silt loam, 0 to 2 percent slopes	55	91	23	33	26	40	41	66	2.3	4.1	110	210
Zurich silt loam, 2 to 4 percent slopes	55	91	23	33	26	40	41	66	2.3	4.1	110	210
Zurich silt loam, 4 to 7 percent slopes	54	85	22	32	25	37	39	61	2.2	3.7	105	190
Zurich silt loam, 4 to 7 percent slopes, eroded	52	80	22	31	25	35	38	58	2.1	3.4	100	175
Zurich silt loam, 7 to 15 percent slopes, eroded	47	75	20	30	23	33	36	55	1.8	3.2	90	160
Zurich and Morley silt loams, 2 to 4 percent slopes	55	85	23	32	26	37	41	61	2.3	3.7	110	190
Zurich and Morley silt loams, 4 to 7 percent slopes, eroded	50	83	21	32	24	36	37	60	2.0	3.6	95	180
Zurich and Nappanee silt loams, 2 to 4 percent slopes	54	83	22	32	25	36	39	60	2.2	3.6	105	180

[1] A. U. D. stands for animal-unit-days, which is a term used to express the carrying capacity of pasture. It is the number of animal units carried per acre multiplied by the number of days the pasture can be grazed during a single grazing season without injury to the sod. For example, an acre of pasture that provides 30 days of grazing for 5 cows has a carrying capacity of 150 animal-unit-days.

TABLE 6.—*Planting guide for wildlife habitats*

[The wildlife classification of each individual soil is shown in the "Guide to Mapping Units." Beach sand, Borrow area, Gravel pits, and Made land were not placed in wildlife groups. Blank spaces in the last column indicate that none of the plants listed in this table make suitable cover for that specific kind of wildlife]

Wildlife group	Kind of wildlife	Suitable food plants	Suitable cover plants
1. Silt loam; well drained to moderately well drained; good available moisture capacity; moderately high productivity (Barrington, Corwin, Grays, Markham, Miami, Montmorenci, Morley, Nappanee, Saylesville, Varna, and Zurich series).	Bobwhite quail	Corn, wheat, buckwheat, rye, sorghum, crownvetch.	Kentucky bluegrass, smooth brome, tall fescue, orchardgrass, redtop, switchgrass, timothy, alfalfa, Ladino clover, red clover, crownvetch, sweetclover.
	Ringneck pheasants.	Corn, wheat, buckwheat, rye, sorghum, crownvetch.	Kentucky bluegrass, smooth brome, tall fescue, orchardgrass, redtop, switchgrass, timothy, alfalfa, Ladino clover, red clover, crownvetch, sweetclover.
	Songbirds	Corn, wheat, buckwheat, rye, sorghum, switchgrass, timothy, Ladino clover, red clover.	Corn, wheat, rye, sorghum, Kentucky bluegrass, smooth brome, tall fescue, orchardgrass, redtop, switchgrass, timothy, alfalfa, Ladino clover, red clover, crownvetch, sweetclover.
	Rabbits	Corn, wheat, rye, sorghum, Kentucky bluegrass, smooth brome, orchardgrass, redtop, switchgrass, timothy, alfalfa, Ladino clover, red clover, crownvetch, sweetclover.	Wheat, rye, sorghum, Kentucky bluegrass, smooth brome, tall fescue, orchardgrass, redtop, switchgrass, timothy, alfalfa, Ladino clover, red clover, crownvetch, sweetclover.
	Deer	Corn, wheat, rye, Kentucky bluegrass, smooth brome, tall fescue, orchardgrass, redtop, timothy, alfalfa, Ladino clover, red clover, crownvetch, sweetclover.	
	Geese	Corn, wheat, buckwheat, rye, sorghum, Ladino clover, red clover.	
	Ducks	Corn, wheat, buckwheat, sorghum, alfalfa.	
2. Silt loam; moderate to moderately slow permeability; water table below a depth of 3 feet, except during wet seasons; moderately high to high productivity; on uplands (Aptakisic, Beecher, Elliott, Martinton, Mundelein, Odell, and Wauconda series).	Bobwhite quail	Corn, wheat, buckwheat, rye, sorghum	Kentucky bluegrass, tall fescue, redtop, switchgrass, timothy, alfalfa, alsike clover, Ladino clover, birdsfoot trefoil.
	Ringneck pheasants.	Corn, wheat, buckwheat, rye, sorghum	Kentucky bluegrass, tall fescue, redtop, switchgrass, timothy, alfalfa, alsike clover, Ladino clover, birdsfoot trefoil.
	Songbirds	Corn, wheat, buckwheat, rye, sorghum, switchgrass, timothy, alsike clover, Ladino clover.	Corn, wheat, rye, sorghum, Kentucky bluegrass, tall fescue, redtop, switchgrass, timothy, alfalfa, alsike clover, Ladino clover, birdsfoot trefoil.
	Rabbits	Corn, wheat, rye, sorghum, Kentucky bluegrass, redtop, switchgrass, timothy, alfalfa, alsike clover, Ladino clover, birdsfoot trefoil.	Wheat, rye, sorghum, Kentucky bluegrass, tall fescue, redtop, switchgrass, timothy, alfalfa, alsike clover, Ladino clover, birdsfoot trefoil.
	Deer	Corn, wheat, rye, Kentucky bluegrass, tall fescue, redtop, timothy, alfalfa, alsike clover, Ladino clover, birdsfoot trefoil.	
	Geese	Corn, wheat, buckwheat, rye, sorghum, alsike clover, Ladino clover.	
	Ducks	Corn, wheat, buckwheat, sorghum, alfalfa.	

TABLE 6.—*Planting guide for wildlife habitats*—Continued

Wildlife group	Kind of wildlife	Suitable food plants	Suitable cover plants
3. Silt loam, silty clay loam. Soils on lowlands have been drained. Soils on uplands have slow to moderate permeability. Water table at a depth of more than 3 feet, except during wet seasons; moderately high to high productivity (Aptakisic, Ashkum, Del Rey, Frankfort, Nappanee, Pella, and Wauconda series).	Bobwhite quail	Corn, wheat, buckwheat, rye, sorghum, browntop millet.	Tall fescue, redtop, reed canarygrass, alsike clover, Ladino clover, birdsfoot trefoil.
	Ringneck pheasants.	Corn, wheat, buckwheat, rye, sorghum, browntop millet.	Tall fescue, redtop, reed canarygrass, alsike clover, Ladino clover, birdsfoot trefoil.
	Songbirds	Corn, wheat, buckwheat, rye, sorghum, browntop millet, alsike clover, Ladino clover.	Corn, wheat, rye, sorghum, tall fescue, redtop, reed canarygrass, alsike clover, Ladino clover, birdsfoot trefoil.
	Rabbits	Corn, wheat, rye, sorghum, redtop, reed canarygrass, alsike clover, Ladino clover, birdsfoot trefoil.	Corn, wheat, rye, sorghum, tall fescue, redtop, reed canarygrass, alsike clover, Ladino clover, birdsfoot trefoil.
	Deer	Corn, wheat, rye, tall fescue, redtop, alsike clover, Ladino clover, birdsfoot trefoil.	
	Geese	Corn, wheat, buckwheat, rye, sorghum, alsike clover, Ladino clover.	
	Ducks	Corn, wheat, buckwheat, sorghum, browntop millet.	
4. Silt loam, loam, sandy loam, gravelly loam, sand; droughty during most years; moderate to low productivity; on uplands (Boyer, Casco, Dresden, Fox, Hennepin, Markham, Morley, Plainfield, Rodman, and Zurich series).	Bobwhite quail	Corn, wheat, rye, sorghum, crownvetch.	Smooth brome, orchardgrass, switchgrass, crownvetch, sweetclover, birdsfoot trefoil.
	Ringneck pheasants.	Corn, wheat, rye, sorghum, crownvetch.	Smooth brome, orchardgrass, switchgrass, crownvetch, sweetclover, birdsfoot trefoil.
	Songbirds	Corn, wheat, rye, sorghum, switchgrass.	Corn, wheat, rye, sorghum, smooth brome, orchardgrass, switchgrass, crownvetch, sweetclover, birdsfoot trefoil.
	Rabbits	Corn, wheat, rye, sorghum, smooth brome, orchardgrass, switchgrass, crownvetch, sweetclover, birdsfoot trefoil.	Corn, wheat, rye, sorghum, smooth brome, orchardgrass, switchgrass, crownvetch, sweetclover, birdsfoot trefoil.
	Deer	Corn, wheat, rye, smooth brome, orchardgrass, crownvetch, sweetclover, birdsfoot trefoil.	
	Geese	Corn, wheat, rye, sorghum.	
	Ducks	Corn, wheat, sorghum.	
5. Silty clay loam, silty clay, loamy fine sand, muck; water table at depths between 1 foot and 3 feet much of the year; variable productivity; on lowlands (Granby, Harpster, Houghton, Montgomery, Peotone, and Sawmill series).	Bobwhite quail	Corn, buckwheat, smartweeds, browntop millet, wild millet.	Wild millet, reed canarygrass.
	Ringneck pheasants.	Corn, buckwheat, browntop millet, wild millet.	Smartweeds, wild millet, reed canarygrass.
	Songbirds	Corn, buckwheat, smartweeds, browntop millet, wild millet.	Corn, wild millet, reed canarygrass.
	Rabbits	Corn, reed canarygrass	Reed canarygrass.
	Deer	Corn, wheat, rye.	
	Muskrats	Corn, smartweeds, wild millet, reed canarygrass.	
	Geese	Corn, buckwheat, smartweeds, wild millet.	
	Ducks	Corn, buckwheat, smartweeds, browntop millet, wild millet.	Wild millet.

TABLE 6.—*Planting guide for wildlife habitats*—Continued

Wildlife group	Kind of wildlife	Suitable food plants	Suitable cover plants
6. Silty clay loam, muck, peat; swampy; ponded water most of the time; variable productivity; on lowlands (Houghton and Peotone series; Marsh).	Ringneck pheasants.	Wild millet	Wild millet, smartweeds, rice cutgrass, cattails.
	Songbirds	Wild millet, smartweeds	Wild millet, cattails.
	Muskrats	Wild millet, smartweeds, rice cutgrass, cattails, arrowhead.	Cattails.
	Geese	Wild millet, smartweeds, rice cutgrass.	Cattails.
	Ducks	Wild millet, smartweeds, rice cutgrass, arrowhead.	Wild millet, cattails.

With the use of the soil map for identification, the engineering interpretations reported here can be useful for many purposes. It should be emphasized that they do not eliminate the need for sampling and testing at the site of specific engineering works involving heavy loads and excavations deeper than the depths of layers here reported. Even in these situations, the soil map is useful for planning more detailed field investigations and for suggesting the kinds of problems that may be expected.

Engineering classification systems

Most highway engineers classify soil material according to the system approved by the American Association of State Highway Officials (AASHO) (*1*). In the AASHO system, soil materials are classified in seven groups, ranging from A–1, which consists of gravelly soils having high bearing strength, to A–7, which consists of clay soils having low bearing strength when wet.

Some engineers prefer to use the Unified classification system (*16*) developed by the Corps of Engineers, U.S. Army. In this system, soil materials are identified as coarse grained (eight classes), fine grained (six classes), or highly organic (one class).

Estimated engineering properties

Table 7 shows estimates of some of the properties of soils that affect engineering work. These data were obtained through the cooperation of the Department of Civil Engineering, University of Illinois. They are based on evaluations of five soil samples (*13*) obtained in Lake County and those of soil samples obtained in other counties in Illinois. All the soil samples were obtained at depths of less than 5 feet and do not constitute a suitable basis for estimating properties of the soil material at a depth of more than 5 feet. Depth to bedrock is not shown because, in this county, bedrock generally is far enough below the surface to be no problem for most engineering purposes. The column headings in table 7 are discussed briefly in the following paragraphs.

The percentages passing the various sieves are based on mechanical analysis according to AASHO Designation: T 88 (*1*).

Permeability is the rate at which water moves through the undisturbed soil. It is expressed in inches per hour. The estimates are based largely on texture, structure, consistence, bulk density, and porosity of the soils. The degrees of permeability are defined in the Glossary.

Available water capacity is the amount of capillary water held in a soil, at field capacity, in a form that can be used readily by plants. At the wilting point of common crops, this amount of water will wet the soil material to a depth of 1 inch without deeper percolation.

Reaction, which is the degree of acidity or alkalinity of a soil, is expressed in pH values. The degrees of acidity and alkalinity are defined in the Glossary.

Shrink-swell potential indicates the volume change to be expected with a change in moisture content. The volume change is also affected by the amount and kind of clay in the soil. An increase in volume is generally accompanied by a loss in bearing strength. If soil materials that have a high shrink-swell potential are used, much damage to building foundations, roads, and other engineering structures results.

The estimates of corrosion potential shown in table 7 are for untreated steel pipes and do not apply to other metals or to concrete. Corrosion potential depends largely on moisture content, conductivity, reaction, aeration, and the activity of organisms capable of causing oxidation-reduction reactions (*8*).

Engineering interpretations

Table 8 lists interpretations of the features that affect the use of soils in Lake County for specific engineering purposes. These interpretations are based on information shown in table 7, on test data for some soils, and on field experience.

The degrees of limitation for foundations of low buildings and sewage systems are slight, moderate, and severe. Slight indicates that the limitations, if any, are easily overcome; moderate indicates that overcoming the limitations is generally feasible; and severe indicates that limitations are difficult to overcome. If the limitation is moderate or severe, onsite investigation is needed before the soil is used for septic tank filter fields or sewage lagoons.

TABLE 7.—*Estimated*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Aptakisic: 365, 982A, 982B. For Nappanee part of 982A and 982B, see Nappanee series.	1-3	0-8	Silt loam	ML or CL	A-4 or A-6
		8-24	Silty clay loam	ML or CL	A-4 or A-7
		24-60	Stratified silt loam and fine sandy loam.	ML, CL, SM, or SC	A-2, A-4, or A-6
Ashkum: 232	[3] 0-1	0-12	Silty clay loam	CL or MH	A-7
		12-35	Silty clay loam	CL	A-7
		35-60	Silty clay loam	CL	A-6 or A-7
Barrington: 443A, 443B, 984B. For Varna part of 984B, see Varna series.	3+	0-12	Silt loam	ML or CL	A-4 or A-6
		12-31	Silty clay loam	CL	A-4, A-6, or A-7
		31-60	Stratified silt and sand	ML, CL, SM, or SC	A-2, A-4, or A-6
Beach sand: 367	0-1	0-60	Sand	SP or SM	A-2 or A-3
Beecher: 298A, 298B	1-3	0-12	Silt loam	ML or CL	A-4 or A-6
		12-33	Silty clay	CL or CH	A-7
		33-60	Silty clay loam	CL	A-6 or A-7
Borrow area: BA. No estimates of properties.					
Boyer: 706B, 706C2 [4]	3+	0-9	Sandy loam to loamy sand	SM	A-2 or A-4
		9-32	Sandy clay loam to loamy sand	SM, SC or CL	A-2 or A-4
		32-60	Coarse sand and very fine gravel	SP, SM or GP	A-2 or A-3
Casco: 323C2 [4]	3+	0-5	Loam	ML or CL	A-4 or A-6
		5-19	Clay loam	CL	A-6 or A-7
		19-60	Stratified sand and gravel	GP, GM, SP, or SM	A-1
Corwin: 495A, 495B	3+	0-11	Silt loam	ML or CL	A-6 or A-7
		11-26	Silty clay loam	CL	A-6 or A-7
		26-60	Silt loam to loam	ML or CL	A-4 or A-6
Del Rey: 192A, 192B	1-3	0-9	Silt loam	ML or CL	A-6
		9-30	Silty clay	CL or CH	A-7
		30-60	Silty clay loam, loam, and silt loam.	CL or ML	A-4 or A-6
Dresden: 325A, 325B	3+	0-11	Loam	ML or CL	A-4 or A-6
		11-29	Sandy clay loam, clay loam	CL	A-6 or A-7
		29-60	Stratified sand and gravel	GP, GM, SP, or SM	A-1
Elliott: 146A, 146B	1-3	0-14	Silt loam	ML or CL	A-6 or A-7
		14-32	Silty clay	CL or CH	A-7
		32-60	Silty clay loam	CL	A-6 or A-7
Fox: 327A, 327B, 327C2,[4] 327D2 [4]	3+	0-8	Loam	ML or CL	A-4 or A-6
		8-28	Clay loam to sandy clay loam	SC or CL	A-6 or A-7
		28-60	Stratified sand and gravel	GP, GM, SP, or SM	A-1
Frankfort: 320A, 320B	1-3	0-9	Silt loam	ML or CL	A-6
		9-33	Silty clay	CH	A-7
		33-60	Silty clay	CL or CH	A-7
Granby: 513	[3] 0-1	0-10	Loamy fine sand	SP or SM	A-2 or A-3
		10-18	Sand	SP or SM	A-2 or A-3
		18-60	Sand	SP or SM	A-2 or A-3
Gravel pits: GP. No estimates of properties.					

See footnotes at end of table.

engineering properties of soils

Percentage passing sieve [1] — No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential for conduits of untreated steel
			Inches per hour	*Inches per inch of soil*	*pH*		
95–100	95–100	80–95	0. 63–2. 00	0. 20–0. 25	5. 1–6. 5	Low	(2).
95–100	90–100	60–90	0. 63–2. 00	0. 18–0. 23	5. 1–6. 0	Moderate	High.
90–100	80–95	30–70	0. 63–2. 00	0. 12–0. 23	7. 4–8. 4	Low	Moderate.
95–100	90–100	85–100	0. 63–2. 00	0. 19–0. 23	6. 1–7. 3	Moderate to high	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	6. 1–7. 8	Moderate to high	High.
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	7. 4–8. 4	Moderate to high	High.
95–100	95–100	80–95	0. 63–2. 00	0. 20–0. 25	5. 6–6. 5	Low	(2).
95–100	90–100	60–90	0. 63–2. 00	0. 19–0. 21	5. 6–7. 3	Moderate	Moderate.
90–100	80–95	30–70	0. 63–2. 00	0. 12–0. 23	7. 4–8. 4	Low	Moderate.
40–80	30–70	0–15	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Low.
95–100	95–100	90–100	0. 63–2. 00	0. 20–0. 25	6. 1–7. 3	Low	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 15–0. 21	5. 6–7. 3	Moderate	High.
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	7. 4–8. 4	Low	High.
100	95–100	30–50	2. 00–6. 30	0. 10–0. 14	6. 1–7. 3	Low	(2).
100	95–100	30–70	0. 63–2. 00	0. 10–0. 18	5. 6–6. 5	Low	Low.
100	95–100	0–20	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Low.
95–100	90–100	50–80	0. 63–2. 00	0. 16–0. 20	6. 6–7. 3	Low	(2).
95–100	90–100	55–85	0. 63–2. 00	0. 16–0. 18	5. 6–7. 3	Low	Moderate.
40–80	30–70	0–15	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Low.
95–100	95–100	80–100	0. 63–2. 00	0. 20–0. 25	5. 6–6. 0	Low	(2).
95–100	90–100	70–95	0. 63–2. 00	0. 18–0. 23	5. 6–6. 5	Moderate	Moderate.
95–100	85–95	55–75	0. 20–2. 00	0. 14–0. 23	7. 4–8. 4	Low	Moderate.
95–100	95–100	90–100	0. 63–2. 00	0. 20–0. 25	5. 1–5. 5	Low	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 15–0. 21	5. 1–7. 3	Moderate	High.
90–100	85–100	70–90	0. 20–2. 00	0. 14–0. 21	7. 4–8. 4	Low	High.
95–100	90–100	50–80	0. 63–2. 00	0. 16–0. 20	5. 6–6. 5	Low	(2).
95–100	90–100	55–85	0. 63–2. 00	0. 16–0. 18	5. 6–7. 3	Moderate	Moderate.
40–80	30–70	0–15	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Low.
95–100	95–100	90–100	0. 63–2. 00	0. 20–0. 25	5. 6–6. 5	Low	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 15–0. 21	5. 6–7. 3	Moderate	High.
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	7. 4–8. 4	Low	High.
95–100	90–100	50–80	0. 63–2. 00	0. 16–0. 20	5. 6–6. 5	Low	(2).
95–100	90–100	40–85	0. 63–2. 00	0. 16–0. 18	5. 1–6. 5	Moderate	Moderate.
40–80	30–70	0–15	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Low.
95–100	95–100	90–100	0. 63–2. 00	0. 20–0. 25	6. 1–7. 3	Low	(2).
95–100	90–100	85–100	0. 06–0. 20	0. 15–0. 18	5. 6–7. 8	Moderate	High.
95–100	90–100	85–100	0. 06–0. 20	0. 15–0. 18	7. 4–8. 4	Low to moderate	High.
100	95–100	0–30	6. 30–20. 0	0. 06–0. 08	6. 6–7. 3	Low	(2).
100	95–100	0–20	6. 30–20. 0	0. 02–0. 06	6. 6–7. 3	Low	High.
100	95–100	0–20	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Moderate.

TABLE 7.—*Estimated engineering*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Grays: 698A, 698B, 979A, 979B. For Markham part of 979A and 979B, see Markham series.	3+	0–11	Silt loam	ML or CL	A–4 or A–6
		11–24	Silty clay loam	CL	A–4, A–6, or A–7
		24–60	Stratified silt and sand	ML, CL, SM or SC	A–2, A–4, or A–6
Harpster: 67	[3] 0–1	0–15	Silty clay loam	CL, CH, or OH	A–7
		15–27	Silty clay loam	CL or CH	A–6 or A–7
		27–60	Silty clay loam, loam, silt loam, and sandy loam.	CL, ML, SM, or SC	A–2, A–4, or A–6
Hennepin: 25F, 25G	3+	0–14	Loam or silt loam	ML or CL	A–4 or A–6
		14–60	Loam or silt loam	ML or CL	A–4 or A–6
Houghton muck: 103, W103	0–1	0–16	Muck	Pt	
	0–1	16–60	Muck	Pt	
Houghton peat: W97	0–1	0–60	Peat	Pt	
Made land: ML. No estimates of properties.					
Markham: 531B, 531B2, 531C, 531C2, [4] 531D2. [4]	3+	0–10	Silt loam	ML or CL	A–4 or A–6
		10–30	Silty clay	CL or CH	A–7
		30–60	Silty clay loam	CL	A–6 or A–7
Marsh: MA. No estimates of properties.					
Martinton: 189A, 189B	1–3	0–14	Silt loam	ML or CL	A–4 or A–6
		14–27	Silty clay	CL or CH	A–7
		27–60	Silty clay loam, loam, and silt loam.	CL or ML	A–4 or A–6
Miami: 27B, 27C, 27C2, [4] 27D, 27D2. [4]	3+	0–8	Silt loam	ML or CL	A–4 or A–6
		8–33	Silty clay loam	CL	A–6 or A–7
		33–60	Silt loam to loam	ML or CL	A–4 or A–6
Montgomery: 465	[3] 0–1	0–11	Silty clay	CH or CL	A–7
		11–32	Silty clay	CH or CL	A–7
		32–60	Silty clay	CH or CL	A–7
Montmorenci: 57B, 57C2 [4]	3+	0–8	Silt loam	ML or CL	A–4 or A–6
		8–25	Silty clay loam	CL	A–6 or A–7
		25–60	Silt loam to loam	ML or CL	A–4 or A–6
Morley: 194B, 194B2, [4] 194C, 194C2, [4] 194D, 194D2, [4] 194E, 194E2. [4]	3+	0–9	Silt loam	ML or CL	A–4 or A–6
		9–28	Silty clay loam, silty clay	CL or CH	A–7
		28–60	Silty clay loam	CL	A–6 or A–7
Mundelein: 442A, 442B, 989A, 989B. For Elliott part of 989A and 989B, see Elliott series.	1–3	0–13	Silt loam	ML or CL	A–4 or A–6
		13–26	Silty clay loam	CL	A–4, A–6, or A–7
		26–60	Stratified silt and sand	ML, CL, SM, or SC	A–2, A–6, or A–4
Nappanee: 228A, 228B, 228C2 [4]	1–3	0–8	Silt loam	ML or CL	A–4 or A–6
		8–27	Silty clay	CH	A–7
		27–60	Silty clay	CL or CH	A–7
Odell: 490A, 490B	1–3	0–10	Silt loam	ML or CL	A–6 or A–7
		10–25	Silty clay loam	CL	A–6 or A–7
		25–60	Silt loam to loam	ML or CL	A–4 or A–6

See footnotes at end of table.

properties of soils—Continued

Percentage passing sieve[1]— No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential for conduits of untreated steel
			Inches per hour	*Inches per inch of soil*	*pH*		
95–100	95–100	80–95	0.63–2.00	0.20–0.25	5.6–7.3	Low	(2).
95–100	90–100	60–90	0.63–2.00	0.18–0.23	5.6–7.4	Moderate	Moderate.
90–100	80–95	30–70	0.63–2.00	0.12–0.23	7.4–8.4	Low	Moderate.
95–100	95–100	85–100	0.63–2.00	0.19–0.23	7.4–8.4	Moderate	(2).
95–100	95–100	85–100	0.63–2.00	0.19–0.21	7.4–8.4	Moderate	High.
90–100	80–100	30–70	0.63–2.00	0.12–0.21	7.4–8.4	Low	High.
100	95–100	55–75	0.63–2.00	0.16–0.25	7.4–8.4	Low	Low.
95–100	85–95	55–75	0.63–2.00	0.14–0.23	7.4–8.4	Low	Low.
			6.30–20.0	>0.25	6.6–7.3	(5)	High.
			6.30–20.0	>0.25	6.1–6.5	(5)	High.
			6.30–20.0	>0.25	4.5–6.5	(5)	High.
95–100	95–100	90–100	0.63–2.00	0.20–0.25	5.6–6.5	Low	(2).
95–100	90–100	85–100	0.20–0.63	0.15–0.21	5.6–7.3	Moderate	High.
95–100	90–100	85–100	0.20–0.63	0.19–0.21	7.4–8.4	Low	High.
95–100	95–100	90–100	0.63–2.00	0.20–0.25	6.1–7.3	Low	(2).
95–100	90–100	85–100	0.20–0.63	0.15–0.21	6.1–7.3	Moderate	High.
90–100	85–100	70–90	0.20–2.00	0.14–0.21	7.4–8.4	Low	High.
95–100	95–100	80–100	0.63–2.00	0.20–0.25	5.6–6.0	Low	(2).
95–100	90–100	70–95	0.63–2.00	0.19–0.21	5.1–6.5	Moderate	Moderate.
95–100	85–95	55–75	0.20–2.00	0.14–0.23	7.4–8.4	Low	Moderate.
95–100	90–100	85–100	0.20–0.63	0.16–0.19	6.6–7.3	Moderate	(2).
95–100	90–100	85–100	0.06–0.20	0.15–0.18	6.1–7.3	Moderate to high	High.
95–100	90–100	85–100	0.06–0.20	0.15–0.18	7.4–8.4	Moderate	High.
95–100	95–100	80–100	0.63–2.00	0.20–0.25	5.6–6.5	Low	(2).
95–100	90–100	70–95	0.63–2.00	0.19–0.21	6.1–7.8	Moderate	Moderate.
95–100	85–95	55–75	0.20–2.00	0.14–0.23	7.4–8.4	Low	Moderate.
95–100	95–100	90–100	0.63–2.00	0.20–0.25	5.1–6.5	Low	(2).
95–100	90–100	85–100	0.20–0.63	0.15–0.18	5.1–7.3	Moderate	High.
95–100	90–100	85–100	0.20–0.63	0.19–0.21	7.4–8.4	Low to moderate	High.
95–100	95–100	80–95	0.63–2.00	0.20–0.25	6.1–7.3	Low	(2).
95–100	90–100	60–90	0.63–2.00	0.14–0.23	6.1–7.3	Moderate	High.
90–100	80–95	30–70	0.63–2.00	0.12–0.23	7.4–8.4	Low	Moderate.
95–100	95–100	90–100	0.63–2.00	0.20–0.25	5.6–7.3	Low	(2).
95–100	90–100	85–100	0.06–0.20	0.15–0.21	5.6–7.3	Moderate	High.
95–100	90–100	85–100	0.06–0.20	0.15–0.18	7.4–8.4	Low to moderate	High.
95–100	95–100	80–100	0.63–2.00	0.20–0.25	6.1–7.3	Low	(2).
95–100	90–100	70–95	0.63–2.00	0.18–0.23	5.6–7.3	Moderate	High.
95–100	85–95	55–75	0.20–2.00	0.14–0.23	7.4–8.4	Low	High.

TABLE 7.—*Estimated engineering*

Soil series and map symbols	Depth to seasonal high water table	Depth from surface	Classification		
			USDA texture	Unified	AASHO
	Feet	*Inches*			
Pella: 153	[3] 0–1	0–15	Silty clay loam	CL, CH, or OH	A–7
		15–34	Silty clay loam	CL or CH	A–6 or A–7
		34–60	Silt loam, loam, and sandy loam	CL, ML, SM, or SC	A–2, A–4, or A–6
Peotone: 330, W330	[3] 0–1	0–16	Silty clay loam	CL	A–7
		16–48	Silty clay loam	CL or CH	A–7
		48–60	Silty clay loam	CL	A–7 or A–6
Plainfield: V54	3+	0–7	Sand	SP or SM	A–2 or A–3
		7–60	Sand	SP or SM	A–2 or A–3
Rodman: 93F	3+	0–7	Gravelly loam	GM or ML	A–2 or A–4
		7–60	Stratified sand and gravel	GP, GM, SP, or SM	A–1
Sawmill: 107	[3] 0–1	0–20	Silty clay loam	CL, CH, MH, or OH	A–7
		20–42	Silty clay loam	CL, CH, or MH	A–7
		42–60	Silty clay loam and strata of other textures.	CL	A–7
Saylesville: 370B, 370C2 [4]	3+	0–9	Silt loam	ML or CL	A–6 or A–7
		9–36	Silty clay to silty clay loam	CL or CH	A–7
		36–60	Silty clay loam, sandy loam, and silt loam.	CL, ML, or MH	A–4, A–6, or A–7
Varna	3+	0–12	Silt loam	ML or CL	A–6 or A–7
		12–35	Silty clay to silty clay loam	CL or CH	A–7
		35–60	Silty clay loam	CL	A–6 or A–7
Wauconda: 697A, 697B, 978A, 978B, 981A, 981B. For Beecher part of 978A and 978B, see Beecher series; for Frankfort part of 981A and 981B, see Frankfort series.	1–3	0–9	Silt loam	ML or CL	A–4 or A–6
		9–26	Silty clay loam	CL	A–4, A–6, or A–7
		26–60	Stratified silt and sand	ML, CL, SM, or SC	A–2, A–4, or A–6
Zurich: 696A, 696B, 696C, 696C2 [4], 696D2 [4], 980B, 980C2 [4], 983B. For Morley part of 980B and 980C2 see Morley series; for Nappanee part of 983B, see Nappanee series.	3+	0–9	Silt loam	ML or CL	A–4 or A–6
		9–28	Silty clay loam	CL	A–4, A–6, or A–7
		28–60	Stratified silt and sand	ML, CL, SM, or CS	A–2, A–4, or A–6

[1] Based on mechanical analyses according to AASHO Designation: T 88–57 (*1*).
[2] Corrosion potential is estimated only for the horizons in which conduits are likely to be buried.

properties of soils—Continued

Percentage passing sieve[1]—			Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosion potential for conduits of untreated steel
No. 4 (4.7 mm.)	No. 10 (2.0 mm.)	No. 200 (0.074 mm.)					
			Inches per hour	*Inches per inch of soil*	*pH*		
95–100	95–100	85–100	0. 63–2. 00	0. 19–0. 23	6. 6–7. 3	Moderate	High.
95–100	95–100	85–100	0. 63–2. 00	0. 19–0. 21	6. 6–7. 3	Moderate	High.
90–100	80–100	30–75	0. 63–2. 00	0. 12–0. 23	7. 4–8. 4	Low	High.
95–100	90–100	85–100	0. 63–2. 00	0. 19–0. 23	6. 6–7. 3	Moderate	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	6. 6–7. 8	Moderate	High.
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	7. 4–8. 4	Moderate	High.
100	95–100	0–20	6. 30–20. 0	0. 02–0. 04	6. 1–6. 5	Low	Low.
100	95–100	0–20	6. 30–20. 0	0. 02–0. 04	6. 1–8. 4	Low	Low.
60–90	40–80	25–55	6. 30–20. 0	0. 05–0. 10	6. 6–7. 8	Low	Low.
40–80	30–70	0–15	6. 30–20. 0	0. 02–0. 06	7. 4–8. 4	Low	Low.
100	95–100	90–100	0. 63–2. 00	0. 19–0. 23	6. 1–7. 3	Moderate	High.
100	95–100	90–100	0. 63–2. 00	0. 19–0. 21	6. 5–7. 3	Moderate	High.
95–100	90–100	80–100	0. 20–0. 63	0. 14–0. 21	7. 4–8. 4	Moderate	High.
95–100	95–100	90–100	0. 63–2. 00	0. 20–0. 25	5. 1–6. 5	Low	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 15–0. 21	5. 6–7. 3	Moderate	Moderate.
95–100	85–100	70–90	0. 20–2. 00	0. 14–0. 23	7. 4–8. 4	Low	Moderate.
95–100	95–100	90–100	0. 63–2. 00	0. 20–0. 25	6. 1–7. 3	Low	(2).
95–100	90–100	85–100	0. 20–0. 63	0. 15–0. 21	5. 6–7. 3	Moderate	High.
95–100	90–100	85–100	0. 20–0. 63	0. 19–0. 21	7. 4–8. 4	Low	High.
95–100	95–100	80–95	0. 63–2. 00	0. 20–0. 25	6. 1–7. 3	Low	(2).
95–100	90–100	60–90	0. 63–2. 00	0. 18–0. 23	5. 6–7. 3	Moderate	High.
90–100	80–95	30–70	0. 63–2. 00	0. 12–0. 23	7. 4–8. 4	Low	Moderate.
95–100	95–100	80–95	0. 63–2. 00	0. 20–0. 25	6. 1–7. 3	Low	(2).
95–100	90–100	60–90	0. 63–2. 00	0. 18–0. 23	5. 6–7. 8	Moderate	Moderate.
90–100	80–95	30–70	0. 63–2. 00	0. 12–0. 23	7. 4–8. 4	Low	Moderate.

[3] Variable; depends on artificial drainage provided.
[4] Most of the uppermost layer has been removed by erosion.
[5] Not estimated.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for—	
	Topsoil	Sand and gravel [1]	Highway subgrade material [2]	Highway and street location [2]	Farm drainage
Aptakisic: 365, 982A, 982B. For Nappanee part of 982A and 982B, see Nappanee series.	Good	Fair: variable thickness of fine sand and silt; scattered pockets of gravel; possibly sand and gravel below a depth of 5 feet in valley of the Des Plaines River.	Fair: low to moderate plasticity; low to moderate shrink-swell potential.	Seasonal high water table; subject to frost heave; seepage in some cuts.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile can be used if outlets are available.
Ashkum: 232	Fair: somewhat clayey material; seasonal high water table.	Not suitable	Poor: high plasticity; moderate to high shrink-swell potential.	Low areas subject to ponding; seasonal high water table; subject to frost heave.	Low areas subject to ponding; seasonal high water table; tile can be used if outlets are available.
Barrington: 443A, 443B, 984B. For Varna part of 984B, see Varna series.	Good	Fair: variable thickness of fine sand and silt; scattered pockets of gravel; possibly sand and gravel below a depth of 5 feet in valley of the Des Plaines River.	Fair to poor to a depth of 3 feet. Fair to good below that depth; low to moderate shrink-swell potential.	Subject to frost heave; seepage in some cuts.	Good natural drainage.
Beach sand: 367	Poor: sandy material; low available moisture capacity.	Good for poorly graded sand.	Good, if soil binder is added.	Unstable; subject to erosion by action of storm waves and wind.	Loose sand; droughty.
Beecher: 298A, 298B.	Fair: clayey material near surface.	Not suitable	Poor: plasticity; moderate shrink-swell potential.	Seasonal high water table; subject to frost heave.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile can be used if outlets are available.
Borrow area: (BA).	[6]	[6]	[6]	[6]	[6]
Boyer: 706B, 706C2.	For the 706B unit, fair: sandy material. For the 706C2 unit, poor: thin surface layer; sandy material.	Good for coarse sand and very fine gravel below a depth of 2 to 3 feet.	Good: sandy material over coarse sand and very fine gravel.	Features are favorable, but sand and gravel may be exposed in cuts.	Good natural drainage.

See footnotes at end of table.

interpretations of soils

Soil features affecting suitability for—Continued		Degree and kind of limitation for—		
Farm ponds		Foundations for low buildings [2 3 4]	Septic tank filter fields [3 5]	Sewage lagoons [3]
Reservoir area	Embankment			
Seepage; lacks dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; moderate to slow seepage when compacted; piping hazard.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Moderate: seasonal high water table; estimated percolation rate of 30 to 45 minutes per inch.	Moderate to severe: moderate permeability but in places substratum has rapid permeability.
Low areas: slow seepage or none; dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; slow seepage when compacted; moderate to high shrink-swell potential.	Severe: low areas subject to ponding; high water table; subject to frost heave; fair to poor bearing strength.	Severe: moderately slow permeability; seasonal high water table; low areas subject to ponding; estimated percolation rate of 60 to 75 minutes per inch.	Severe: low areas subiect to ponding; seasonal high water table.
Seepage; low water table.	Fair stability and compaction characteristics; moderate to slow seepage when compacted; piping hazard.	Slight: fair bearing strength.	Slight: estimated percolation rate of 30 to 45 minutes per inch.	Moderate to severe: moderate permeability, but in places the substratum has rapid permeability.
Not applicable	Not applicable	Severe: unstable; subject to storm waves.	Severe: unstable; storm waves; severe contamination of beach areas; contamination of ground water through sandy or gravelly material is possible.	Severe: rapid permeability; poor material for reservoir and embankment; contamination of ground water through sandy or gravelly material is possible.
Slow seepage or none; lack dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; slow seepage when compacted.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Severe: moderately slow permeability; seasonal high water table; estimated percolation rate slower than 75 minutes per inch.	For the 298A unit, slight. For the 298B unit, moderate: slopes of 2 to 4 percent.
(6)	(6)	(6)	(6)	(6).
Sandy material; sand and gravel below a depth of 2 to 3 feet; rapid seepage; low water table.	Uppermost 2 to 3 feet of sandy material has fair to good stability and compaction characteristics; moderate to slow seepage when compacted; underlying sandy and gravelly material has rapid seepage when compacted.	Slight: somewhat droughty in places; good bearing strength.	For the 706B unit, slight. For the 706C2 unit, moderate: moderate slope. For both units, contamination of ground water through sandy or gravelly material is possible; estimated percolation rate of 1 minute to 15 minutes per inch.	Severe: rapid permeability; slopes of 2 to 7 percent; contamination of ground water through sandy or gravelly material is possible.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for—	
	Topsoil	Sand and gravel [1]	Highway subgrade material [2]	Highway and street location [2]	Farm drainage
Casco: 323C2	Poor: thin surface layer; gravelly material.	Good: stratified sand and gravel.	Good below a depth of 1½ feet; stratified sand and gravel.	Features are favorable, but gravel is exposed in cuts.	Excessive natural drainage.
Corwin: 495A, 495B.	Good	Not suitable	Poor to a depth of 2 feet: plasticity; moderate shrink-swell potential. Fair to poor below a depth of 2 feet.	Subject to frost heave.	Good natural drainage.
Del Rey: 192A, 192B.	Fair: clayey material near surface.	Not suitable	Poor to a depth of 2½ feet: high plasticity; moderate shrink-swell potential. Fair to poor below a depth of 2½ feet.	Seasonal high water table; subject to frost heave; moderate shrink-swell potential.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile may function poorly.
Dresden: 325A, 325B.	Good	Good source of stratified sand and gravel below a depth of 2 to 3 feet.	Good below a depth of 2 to 3 feet: stratified sand and gravel.	Features favorable, but gravel is likely to be exposed in cuts.	Good natural drainage.
Elliott: 146A, 146B.	Good	Not suitable	Poor: high plasticity; moderate shrink-swell potential.	Seasonal high water table; subject to frost heave.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile can be used if outlets are available.
Fox: 327A, 327B, 327C2, 327D2.	For the 327A and 327B units, fair: thin surface layer. For the 327C2 and 327D2 units, poor: thin surface layer; strong slopes in 327D2 unit.	Good source of sand and gravel below a depth of 2 to 3 feet.	Good below a depth of 2 to 3 feet: stratified sand and gravel.	Features favorable, but gravel is likely to be exposed in cuts.	Good natural drainage.
Frankfort: 320A, 320B.	Fair: clayey material near surface.	Not suitable	Poor: high plasticity; moderate shrink-swell potential.	Seasonal high water table; moderate shrink-swell potential; poor bearing strength; subject to frost heave.	Seasonally wet; slow permeability; clayey material; tile does not function well; surface drainage needed.

See footnotes at end of table.

interpretations of soils—Continued

Soil features affecting suitability for—Continued		Degree and kind of limitation for—		
Farm ponds		Foundations for low buildings [2 3 4]	Septic tank filter fields [3 5]	Sewage lagoons [3]
Reservoir area	Embankment			
Sandy and gravelly material; rapid seepage; low water table.	Sandy and gravelly material; rapid seepage; difficult to vegetate.	Moderate: moderate slope; droughty; good bearing strength.	Moderate: moderate slope; contamination of ground water through sandy or gravelly material is possible; estimated percolation rate of 1 minute to 15 minutes per inch.	Severe: rapid permeability through gravel and sand; contamination of ground water is possible.
Possible seepage; low water table.	Fair stability and compaction characteristics; slow seepage when compacted.	Slight: fair bearing strength.	Moderate: moderate permeability in the subsoil; estimated percolation rate of 45 to 75 minutes per inch.	Moderate: moderate permeability in the subsoil; slopes of 0 to 4 percent.
Slight seepage; lacks dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; slow seepage when compacted.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Severe: moderately slow permeability; seasonal high water table; estimated percolation rate slower than 75 minutes per inch.	Moderate: moderately slow permeability; slopes of 0 to 4 percent.
Stratified sand and gravel below a depth of 2 to 3 feet; rapid seepage; low water table.	Loamy material to a depth of 2 to 3 feet; fair to good stability and compaction characteristics; slow seepage when compacted; underlying sandy and gravelly material has rapid seepage when compacted.	Slight: good bearing strength.	Slight: contamination of ground water through sandy or gravelly material is possible; estimated percolation rate of 15 to 30 minutes per inch.	Severe: sand and gravel below a depth of 2 to 3 feet; rapid permeability; contamination of ground water through sandy or gravelly material is possible.
Slow seepage or none; lacks dependable high water table, which is necessary for dugout ponds.	Fair to good stability and compaction characteristics; slow seepage when compacted.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Severe: moderately slow permeability; seasonal high water table; estimated percolation rate slower than 75 minutes per inch.	For the 146A unit, slight. For the 146B unit, moderate: slopes of 2 to 4 percent.
Stratified sand and gravel below a depth of 2 to 3 feet; rapid seepage; low water table.	Loamy material to a depth of 2 to 3 feet has fair to good stability and compaction characteristics; slow seepage when compacted; sandy and gravelly material below a depth of 2 to 3 feet has rapid seepage when compacted.	For the 327A, 327B, and 327C2 units, slight: good bearing strength. For the 327D2 unit, moderate: strong slopes; somewhat droughty; good bearing strength.	For the 327A and 327B units, slight. For the 327C2 and 327D2 units, moderate: moderate to strong slopes. For all units, estimated percolation rate of 15 to 30 minutes per inch.	Severe: sand and gravel below a depth of 2 to 3 feet has rapid permeability; contamination of ground water through sandy or gravelly material is possible.
Slow seepage or none; lacks dependable high water table, which is necessary for dugout ponds.	Fair to poor stability and compaction characteristics; high compressibility; slow seepage when compacted.	Severe: clay material; plasticity; slow permeability; seasonal high water table; moderate shrink-swell potential; poor bearing strength.	Severe: slow permeability; seasonal high water table; estimated percolation rate slower than 90 minutes per inch.	For the 320A unit, slight. For the 320B unit, moderate: slopes of 2 to 4 percent.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for—	
	Topsoil	Sand and gravel [1]	Highway subgrade material [2]	Highway and street location [2]	Farm drainage
Granby: 513	Poor: sandy material; water table continuously high.	Good for sand, but water table continuously high.	Fair: sand; water table continuously high and may hinder excavation.	Water table continuously high; sandy material loses stability and flows when wet.	Wet sandy soil; water table generally near surface, but varies with water level in Lake Michigan; drainage is difficult.
Gravel pits: GP	(6)	(6)	(6)	(6)	(6)
Grays: 698A, 698B, 979A, 979B. For Markham part of 979A and 979B, see Markham series.	Good	Fair: variable thickness of fine sand and silt; scattered pockets of gravel; possibly sand and gravel below a depth of 5 feet in valley of the Des Plaines River.	Fair to poor to a depth of 3 feet. Fair to good below that depth.	Subject to frost heave; low to moderate shrink-swell potential; fair bearing strength.	Good to moderately good drainage.
Harpster: 67	Fair: seasonal high water table; somewhat clayey material.	Not suitable	Poor to a depth of 3 feet; high plasticity; moderate shrink-swell potential. Fair to poor below a depth of 3 feet.	Low areas subject to ponding; seasonal high water table; subject to frost heave; fair to poor bearing strength.	Low areas; seasonal high water table; tile can be used if outlets are available.
Hennepin: 25F, 25G.	Poor: steep; thin surface layer.	Not suitable	Fair to poor: moderate plasticity; low shrink-swell potential.	Steep areas: need for deep cuts and fills; subject to frost heave.	Good natural drainage.
Houghton: W97, 103, W103.	Poor: the W97 unit is a source of peat, and the 103 and W103 units are sources of muck; wet areas in W97 and W103.	Not suitable	Not suitable: organic material; high compressibility; very poor bearing strength.	Low areas; unstable; organic material; high compressibility; high water table; flooding in some areas; subsidence in drained areas; very poor bearing strength.	Low areas of muck and peat; ponding is common, and water table is at surface unless lowered artificially; unstable for tile lines; drainage outlets generally scarce.
Made land: ML	(6)	(6)	(6)	(6)	(6)
Markham: 531B, 531B2, 531C, 531C2, 531D2.	For the 531B and 531C units, fair: clayey material near surface. For the 531B2, 531C2, and 531D2 units, poor: clayey material.	Not suitable	Poor: high plasticity; moderate shrink-swell potential in subsoil.	Subject to frost heave; need for cuts and fills in some places; moderate shrink-swell potential in subsoil.	Good to moderately good natural drainage.
Marsh: MA	(6)	(6)	(6)	(6)	(6)

See footnotes at end of table.

interpretations of soils—Continued

Soil features affecting suitability for—Continued		Degree and kind of limitation for—		
Farm ponds		Foundations for low buildings [2 3 4]	Septic tank filter fields [3 5]	Sewage lagoons [3]
Reservoir area	Embankment			
Wet sand; water table varies with water level in Lake Michigan.	Not applicable	Moderate: water table continuously high; good bearing strength when sand is confined.	Severe: water table continuously high; subject to ponding; contamination of ground water through sandy or gravelly material is possible.	Severe: sandy material; water table continuously high; poor material for reservoir and embankment; contamination of ground water through sandy or gravelly material is possible.
([6])	([6])	([6])	([6])	([6]).
Seepage; low water table.	Fair stability and compaction characteristics; moderate to slow seepage when compacted.	Slight: fair bearing strength.	Slight: estimated percolation rate of 30 to 45 minutes per inch.	Moderate to severe: moderate permeability, but in places substratum has rapid permeability; slopes of 0 to 4 percent.
Low level areas; seepage: seasonal high water table.	Fair stability and compaction characteristics; slow seepage when compacted; moderate shrink-swell potential.	Severe: low areas subject to ponding; high water table; fair to poor bearing strength; subject to frost heave.	Severe: seasonal high water table; low areas subject to ponding; estimated percolation rate of 30 to 45 minutes per inch.	Severe: low areas subject to ponding; seasonal high water table; moderate permeability.
Steep; seepage; low water table.	Fair stability and compaction characteristics; slow seepage when compacted; medium compressibility; fair resistance to piping.	Severe: steep; fair bearing strength.	Severe: steep	Severe: steep; moderate permeability.
Level or depressional; organic material; water table continuously high unless artificially lowered.	Not suitable; organic material.	Severe: unstable; organic material; poor bearing strength; high compressibility; water table continuously high; flooding in some areas.	Severe: very unstable; organic material; poor support for septic tank and filter field; continuously high water table; ponding is common.	Severe: organic material; material not suitable for reservoir or embankment; water table continuously high; rapid permeability; ponding is common; flooding in some areas.
([6])	([6])	([6])	([6])	([6]).
Slow seepage or none; low water table; slope.	Fair stability and compaction characteristics; slow seepage when compacted.	Moderate: clayey material; fair bearing strength.	Severe: moderately slow permeability; slopes of 2 to 12 percent; estimated percolation rate slower than 75 minutes per inch.	For the 531B, 531B2, 531C, and 531C2 units, moderate: slopes of 2 to 7 percent. For the 531D2 unit, severe: slopes of 7 to 12 percent.
([6])	([6])	([6])	([6])	([6]).

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for—	
	Topsoil	Sand and gravel [1]	Highway subgrade material [2]	Highway and street location [2]	Farm drainage
Martinton: 189A, 189B.	Good	Not suitable	Poor to a depth of 3 feet; plasticity; moderate shrink-swell potential in the subsoil. Fair to poor in substratum.	Seasonal high water table; subject to frost heave; moderate shrink-swell potential in the subsoil.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile can be used if outlets are available.
Miami: 27B, 27C, 27C2, 27D, 27D2.	For the 27B and 27C units, fair. For the 27C2, 27D, and 27D2 units, poor: thin surface layer in the 27C2 and 27D2 units.	Not suitable	Fair to poor: moderate plasticity; moderate shrink-swell potential in the subsoil.	Subject to frost heave; need for cuts and fills in some places.	Good natural drainage.
Montgomery: 465	Poor: clayey material; seasonal high water table.	Not suitable	Very poor: high plasticity; moderate to high shrink-swell potential; high compressibility.	Low areas subject to ponding; seasonal high water table; subject to frost heave; high plasticity when wet; moderate to high shrink-swell potential; poor bearing strength.	Seasonally wet; clayey material; slow permeability; tile does not function well; surface drainage needed.
Montmorenci: 57B, 57C2.	For the 57B unit, good. For the 57C2 unit, poor: thin surface layer.	Not suitable	Fair to poor: moderate plasticity; moderate shrink-swell potential in the subsoil.	Subject to frost heave; need for cuts and fills in some places.	Good natural drainage.
Morley: 194B, 194B2, 194C, 194C2, 194D, 194D2, 194E, 194E2.	For the 194B and 194C units, fair: clayey material near surface. For the 194B2, 194C2, 194D, 194D2, 194E, and 194E2 units, poor: low organic-matter content; clayey material on or near surface.	Not suitable	Poor: high plasticity; moderate shrink-swell potential.	Subject to frost heave; high plasticity when wet; need for cuts and fills in some places.	Good to moderately good natural drainage.
Mundelein: 442A, 442B, 989A, 989B. For Elliott part of 989A and 989B, see Elliott series.	Good	Fair: variable thickness of fine sand and silt; scattered pockets of gravel; possibly sand and gravel below a depth of 5 feet in valley of the Des Plaines River.	Fair to poor to a depth of 2½ feet; moderate shrink-swell potential. Fair to good below a depth of 2½ feet.	Seasonal high water table; subject to frost heave.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile can be used if outlets are available.

See footnotes at end of table.

interpretations of soils—Continued

Soil features affecting suitability for—Continued		Degree and kind of limitation for—		
Farm ponds		Foundations for low buildings [2 3 4]	Septic tank filter fields [3 5]	Sewage lagoons [3]
Reservoir area	Embankment			
Slow seepage; lacks dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; slow seepage when compacted.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Severe: moderately slow permeability; seasonal high water table; estimated percolation rate of 60 to 75 minutes per inch.	Moderate: moderately slow permeability; slopes of 0 to 4 percent.
Slow to moderate seepage; low water table; slope.	Fair stability and compaction characteristics; slow seepage when compacted; medium compressibility; fair resistance to piping.	Moderate: fair bearing strength; 2 to 12 percent slopes; subject to frost heave; moderate shrink-swell potential in subsoil.	Moderate: moderate to moderately slow permeability; slopes of 2 to 12 percent; estimated percolation rate of 45 to 75 minutes per inch.	For the 27B, 27C, and 27C2 units, moderate: slopes of 2 to 7 percent; moderate to moderately slow permeability. For the 27D and 27D2 units, severe: slopes exceed 7 percent; moderate to moderately slow permeability.
Slow seepage or none; dependable high water table, which is necessary for dugout ponds.	Poor to fair stability and compaction characteristics; high compressibility; slow seepage when compacted; moderate to high shrink-swell potential.	Severe: high water table; clayey; plasticity; high compressibility; moderate to high shrink-swell potential; poor bearing strength; low areas subject to ponding.	Severe: slow permeability; seasonal high water table; low areas subject to ponding; estimated percolation rate slower than 90 minutes per inch.	Severe: low areas subject to ponding; seasonal high water table; plasticity.
Slow to moderate seepage; low water table; slope.	Fair stability and compaction characteristics; slow seepage when compacted; medium compressibility; fair resistance to piping.	Moderate: fair bearing strength; moderate shrink-swell potential in subsoil; subject to frost heave; slopes of 2 to 7 percent.	Moderate: moderate to moderately slow permeability; slopes of 2 to 7 percent; estimated percolation rate of 45 to 75 minutes per inch.	Moderate: slopes of 2 to 7 percent; moderate to moderately slow permeability.
Slow seepage; low water table; slope.	Fair stability and compaction characteristics; slow seepage when compacted.	For the 194B, 194B2, 194C, 194C2, 194D, and 194D2 units, moderate: fair bearing strength; clayey material. For the 194E and 194E2 units, severe: moderately steep; clayey material; probable differential bearing strength in cuts.	Severe: moderately slow permeability; slopes of 2 to 18 percent; estimated percolation rate slower than 75 minutes per inch.	For the 194B, 194B2, 194C, 194C2 units, moderate: slopes of 2 to 7 percent. For the 194D, 194D2, 194E, and 194E2 units, severe: slopes exceed 7 percent.
Seepage; lacks dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; moderate to slow seepage when compacted; piping hazard.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Moderate: seasonal high water table; estimated percolation rate of 30 to 45 minutes per inch.	Moderate to severe: moderate permeability, but in some places, the substratum has rapid permeability; slope range of 0 to 4 percent.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for—	
	Topsoil	Sand and gravel [1]	Highway subgrade material [2]	Highway and street location [2]	Farm drainage
Nappanee: 228A, 228B, 228C2.	Poor: clayey material near surface.	Not suitable	Poor: high plasticity; moderate shrink-swell potential.	Seasonal high water table; high plasticity when wet; moderate shrink-swell potential; poor bearing strength.	Seasonally wet; clayey material; slow permeability; tile does not function well; surface drainage generally adequate on 4 to 7 percent slopes.
Odell: 490A, 490B	Good	Not suitable	Poor to a depth of 2 feet; plasticity; moderate shrink-swell potential. Fair to poor below a depth of 2 feet; low shrink-swell potential.	Seasonal high water table; subject to frost heave.	Seasonal high water table at a depth of 1 foot to 3 feet, unless drainage is provided; tile can be used if outlets are available.
Pella: 153	Fair: seasonal high water table; somewhat clayey material.	Poor: variable thickness of fine sand and silt; scattered pockets of gravel.	Poor to a depth of 3 feet; plasticity; moderate shrink-swell potential. Fair to poor below the subsoil; low to moderate shrink-swell potential.	Low areas subject to ponding; seasonal high water table; highly subject to frost heave.	Low areas; seasonal high water table; tile can be used if outlets are available.
Peotone: 330, W330.	For the 330 unit, fair: seasonal high water table; somewhat clayey material. For the W330 unit, poor: wet areas, somewhat clayey material.	Not suitable	Poor: high plasticity; moderate shrink-swell potential.	Depressional areas subject to ponding; seasonal high water table; subject to frost heave; high plasticity when wet; fair to poor bearing strength.	Low areas subject to ponding; seasonal high water table within 1 foot of surface; tile can be used if outlets are available.
Plainfield: V54	Poor: sandy material; low available moisture capacity.	Good for sand	Good: generally need to add soil binder.	Loose sand is easily excavated, but it sometimes hinders hauling; subject to wind erosion; cuts and fills difficult to vegetate.	Sand; droughty
Rodman: 93F	Poor: gravelly material; steep.	Good for stratified gravel and sand.	Good: stratified sand and gravel.	Steep; stratified sand and gravel; need for deep cuts and fills, which are difficult to vegetate.	Excessive natural drainage.
Sawmill: 107	Fair: seasonal high water table; somewhat clayey material on bottom lands.	Not suitable in most areas.	Poor: on bottom lands; plasticity; moderate shrink-swell potential.	Seasonal high water table; subject to flooding; subject to frost heave; fair to poor bearing strength; plasticity when wet.	High water table; tile can be used if outlets are available; subject to flooding.

See footnotes at end of table.

interpretations of soils—Continued

Soil features affecting suitability for—Continued		Degree and kind of limitation for—		
Farm ponds		Foundations for low buildings [2 3 4]	Septic tank filter fields [3 5]	Sewage lagoons [3]
Reservoir area	Embankment			
Slow seepage to none; lacks dependable high water table, which is necessary for dugout ponds.	Fair to poor stability and compaction characteristics; high compressibility; moderate shrink-swell potential.	Severe: clayey material; plasticity; slow permeability; seasonal high water table; moderate shrink-swell potential; poor bearing strength.	Severe: slow permeability; seasonal high water table; estimated percolation rate slower than 90 minutes per inch.	For the 228A unit, slight. For the 228B and 228C units, moderate: slope range of 2 to 7 percent.
Possible seepage; lacks dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; slow seepage when compacted.	Moderate: seasonal high water table; subject to frost heave; fair bearing strength.	Moderate to severe: moderate to moderately slow permeability; seasonal high water table; estimated percolation rate of 45 to 75 minutes per inch.	Moderate: moderate to moderately slow permeability; high organic-matter content to a depth of 10 inches; slope range of 0 to 4 percent.
Low areas; seepage; seasonal high water table.	Level areas; fair stability and compaction characteristics; moderate shrink-swell potential; medium to high compressibility.	Severe: low areas; seasonal high water table; subject to frost heave.	Severe: seasonal high water table; low areas subject to ponding; estimated percolation rate of 30 to 45 minutes per inch.	Severe: low areas; subject to ponding; moderate permeability; seasonal high water table.
Depressional areas; slow seepage or none; generally dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; slow seepage when compacted; moderate shrink-swell potential.	Severe: low areas subject to ponding; high water table; subject to frost heave; fair to poor bearing strength.	Severe: moderately slow permeability; seasonal high water table; low areas subject to ponding; estimated percolation rate of 60 to 75 minutes per inch.	Severe: seasonal high water table; low areas subject to ponding.
Sand; rapid seepage; low water table.	Sand; poor stability; rapid seepage; poor resistance to piping.	Moderate: loose sand; droughty; good bearing strength if confined.	Slight: contamination of ground water through sandy or gravelly material is possible; estimated percolation rate of 1 minute to 15 minutes per inch.	Severe: sand; rapid permeability in reservoir and embankment; contamination of ground water through sandy or gravelly material is possible.
Sand and gravel; rapid seepage.	Steep; sand and gravel; rapid seepage.	Severe: steep; gravelly; drough y.	Severe: steep; contamination of ground water through sandy or gravelly material is possible.	Severe: steep; rapid permeability in reservoir and embankment; contamination of ground water through sandy or gravelly material is possible.
Slight to moderate seepage; seasonal high water table; needs to be protected from floodwater contamination.	Fair to poor stability and compaction characteristics; high compressibility; slow seepage when compacted; moderate shrink-swell potential.	Severe: on flood plains; high water table; fair to poor bearing strength.	Severe: high water table; subject to flooding; moderate to moderately slow permeability; estimated percolation rate of 60 to 75 minutes per inch.	Severe: subject to flooding; high water table.

TABLE 8.—*Engineering*

Soil series and map symbols	Suitability as a source of—			Soil features affecting suitability for—	
	Topsoil	Sand and gravel [1]	Highway subgrade material [2]	Highway and street location [2]	Farm drainage
Saylesville: 370B, 370C2.	For the 370B unit, fair; clayey material near surface. For the 370C2 unit, poor: thin surface layer; somewhat clayey material.	Not suitable	Poor to a depth of 3 feet; plasticity; moderate shrink-swell potential. Fair to poor below a depth of 3 feet.	Plasticity when wet; subject to frost heave; fair stability.	Good natural drainage.
Varna	Good	Not suitable	Poor: plasticity; moderate shrink-swell potential in subsoil and low shrink-swell potential below the subsoil.	Plasticity when wet; subject to frost heave; fair stability.	Good to moderately good natural drainage.
Wauconda: 697A, 697B, 978A, 978B, 981A, 981B. For Beecher part of 978A and 978B, see Beecher series; for Frankfort part of 981A and 981B, see Frankfort series.	Good	Fair: variable thickness of fine sand and silt; scattered pockets of gravel; possibly sand and gravel below a depth of 5 feet in valley of the Des Plaines River.	Fair to poor in subsoil; moderate shrink-swell potential. Fair to good below the subsoil; low shrink-swell potential.	Seasonal high water table; subject to frost heave; seepage in some cuts.	Seasonal high water table at a depth of 1 foot to 3 feet; tile can be used if outlets are available.
Zurich: 696A, 696B, 696C, 696C2, 696D2, 980B, 980C2, 983B. For Morley part of 980B and 980C2, see Morley series; for Nappanee part of 983B, see Nappanee series.	For the 696A, 696B, and 696C units, fair: thin surface layer. For the 696C2 and 696D2 units, poor: thin surface layer; somewhat clayey material.	Fair: variable thickness of fine sand and silt; scattered pockets of gravel; possibly sand and gravel below a depth of 5 feet in valley of the Des Plaines River.	Fair to poor to a depth of 2 or 3 feet; moderate shrink-swell potential. Fair to good below a depth of 2 or 3 feet; low shrink-swell potential.	Subject to frost heave; seepage in some cuts.	Good to moderately good natural drainage.

[1] Some soils rated as "Not suitable" have erratic deposits of sand and gravel at depths below the 5 feet shown in this publication. Data published in geology reports are needed to determine the location of those deposits likely to furnish commercial quantities.

[2] Engineers and others should not apply specific values to the estimates given for bearing strength of these soils.

[3] "Slight" indicates that the limitations, if any, are easy to overcome; "moderate" indicates that overcoming the limitations is generally feasible; "severe" indicates that the limitations are difficult to overcome, and the use of the soil for this purpose is questionable.

[4] These ratings apply to residential, light commercial, and other buildings that are less than 3 stories high. Onsite investigation is required for the foundations of heavier structures.

interpretations of soils—Continued

Soil features affecting suitability for—Continued		Degree and kind of limitation for—		
Farm ponds		Foundations for low buildings [2 3 4]	Septic tank filter fields [3 5]	Sewage lagoons [3]
Reservoir area	Embankment			
Seepage in some places; low water table.	Fair stability and compaction characteristics; slow seepage when compacted.	Moderate: clayey material; fair bearing strength.	Severe: moderately slow permeability; slope range of 2 to 7 percent; estimated percolation rate of 60 to 75 minutes per inch.	Moderate: slopes exceed 2 percent; moderate to moderately slow permeability in substratum.
Slow seepage or none; low water table.	Fair to good stability and compaction characteristics; slow seepage when compacted.	Moderate: clayey material; fair bearing strength.	Severe: moderately slow permeability; estimated percolation rate of 30 to 90 minutes per inch.	Moderate: slopes exceed 2 percent.
Seepage; lacks dependable high water table, which is necessary for dugout ponds.	Fair stability and compaction characteristics; moderate to slow seepage when compacted; piping hazard.	Moderate: seasonal high water table; fair bearing strength.	Moderate: seasonal high water table; estimated percolation rate of 30 to 45 minutes per inch.	Moderate to severe; moderate permeability, but in some places, substratum has rapid permeability.
Seepage; low water table; slope.	Fair stability and compaction characteristics; moderate to slow seepage when compacted; piping hazard.	For the 696A, 696B, 696C, and 696C2 units, slight; fair bearing strength. For the 696D2 unit, moderate: strong slope; fair bearing strength.	For the 696A and 696B units, slight. For the 696C, 696C2, and 696D2 units, moderate: slope range of 4 to 12 percent. For all units, estimated percolation rate of 30 to 45 minutes per inch.	For the 696A, 696B, 696C, and 696C2 units, moderate to severe: moderate permeability, but in some places substratum has rapid permeability; slope range of 0 to 7 percent. For the 696D2 unit, Severe: slopes exceed 7 percent; moderate permeability, but in some places substratum has rapid permeability.

[5] Estimates of percolation rates are based on test data gathered jointly by the Lake County Health Department and the Soil Conservation Service and on past experience.

[6] These land types are so variable that onsite investigation is needed to determine kind of material, degree of wetness, and other features.

Following are brief explanations of some of the column headings in table 8.

Topsoil is soil material that is used to grow vegetation on roadbanks, lawns, and dams. Only the surface layer of a soil is rated. The ratings are based on the organic-matter content and the ease with which the soil material can be worked. Wet, cloddy soil material, when excavated and dried, may make excellent topsoil.

Suitability as a source of sand and gravel depends on the presence of deposits of these materials within 5 feet of the surface. Deposits at greater depth can be located from data published in geology reports.

Ratings of suitability for highway subgrade material are based on the performance of the soil material when excavated and used in embankments that support the subbase, base, or surface course. These ratings also apply to suitability as fill, which is soil material used for backfilling foundations or trenches. In general, the most desirable material is sand, because sand is least affected by adverse weather conditions and can be worked during a greater number of months of the year. The least desirable materials are plastic clay and organic material. The features that affect the use of soils for subgrade are compressibility, workability, shrink-swell potential, bearing strength, and compaction characteristics.

In selecting locations for highways and streets, the entire profile of an undisturbed soil is evaluated. Because of its greater content of organic matter, the surface layer is ordinarily removed.

The soil features that affect farm drainage both by surface ditches and by subsurface tile, are permeability, depth to the water table, topography, stability, frequency of flooding or ponding, and the availability of outlets.

The features that affect the use of soils as reservoir areas for dugout ponds and for impoundments are permeability, seepage, depth to the water table, and depth to material that would allow seepage. Depth to the water table is more important in dugout ponds, and seepage is more important in impoundments. Only the features of an undisturbed soil are considered.

The features considered in determining suitability for use in pond embankments are compaction characteristics, stability, shrink-swell potential, permeability when compacted, and erodibility. Only the features of disturbed soil material are considered. Topography should be favorable, and the watershed should be of adequate size.

In determining the degree of limitation for foundations of low buildings, only undisturbed soils are considered. The buildings are less than 3 stories high and may be residential or light commercial buildings. The soil features affecting the degree of limitation are bearing strength, depth to the water table, texture, slope, erosion hazard, and flooding or ponding. Figure 9 shows an area

***Figure 9.*—An area of Morley silt loam, 4 to 7 percent slopes, eroded.**

of Morley silt loam, 4 to 7 percent slopes, eroded, from which 3 to 5 tons of surface soil per acre has been lost through erosion. For foundations of heavier structures, detailed onsite investigation is necessary. The prevention of wetness in basements is a troublesome problem in Lake County, but the problem can be greatly alleviated by selecting either dry sites or sites where drainage can be installed. Figure 10 shows part of an extensive drainage system being constructed in an area included in Houghton muck. This soil is difficult to drain and has severe limitations for building foundations.

A septic tank filter field is a system of subsurface tile laid in such a way that the effluent is uniformly distributed into the soil. Among the soil features that determine the degree of limitation for septic tank filter fields are flooding (fig. 11), ponding, depth to the water table, slope, and permeability. Flooding and ponding are severe limitations even if the permeability is rapid and the water table, in summer, is below a depth of 3 feet. Slopes of more than 3 percent pose problems of layout and construction. The rapid permeability of some soils may permit sewage effluent to travel long distances and to contaminate nearby groundwater supplies. Where this kind of contamination is a limitation, it is noted in table 8, as for example, in Boyer soils. The estimated percolation rates (*14*) given are based on test data gathered by health workers in the county.

Sewage lagoons are shallow basins used to hold sewage until it is decomposed. Specifications for lagoons (*3*) state that the depth of the liquid should be not less than 2 feet and generally not more than 5 feet and that the floor should be sufficiently impervious to preclude excessive loss of liquid. The features that affect the use of a soil for lagoon embankments are the same as those that affect use for farm pond embankments. For the basin floor, the requirements are a smooth, nearly level surface, little or no organic-matter content, and characteristics that allow effective sealing against seepage. Organic matter promotes the growth of aquatic plants, which interfere with the functioning of the lagoon.

Woodland

When the first settlers came, much of Lake County was forested with excellent stands that consisted of oak, hickory, maple, and other hardwood trees. Tamarack trees covered many areas of Houghton peat.

There followed many years during which a large part of the better woodland sites were cleared for farming and the quality and quantity of the trees were reduced by fire, grazing, and poor cutting practices. In 1958, according to a study conducted in the county, only 21,773 acres of woodland remained. Since that time, urbanization, in-

***Figure 10.*—Drainage ditch on Houghton muck. The basement floor of the house is at ground level. Light-colored area near bottom of ditchbank consists of silty and clayey material.**

Figure 11.—**Flooding in a residential area on Sawmill silty clay loam.**

cluding a demand for wooded homesites, has further reduced the acreage.

At present the woodland consists of understocked stands of poor-quality trees. A large part of it is on the steeper Morley, Hennepin, and Rodman soils and on inadequately drained soils along the rivers and streams. Only one area of significant size remains in tamarack trees, and it belongs to the State of Illinois.

Many acres of severely eroded soils in Lake County should be reforested. Also, the development of additional woodland for protection of watersheds, for wildlife cover, and for recreational purposes would be beneficial.

Tree Plantings [4]

The soils in Lake County have been placed in six tree planting groups. In table 9 each group is briefly described, and the trees normally most suitable for forest plantings, ornamental plantings, and windbreak plantings are shown. The names of the soil series represented are mentioned in the description of each group, but this does not mean that all the soils in a given series are in the group. The tree planting classification of each individual soil is given in the "Guide to Mapping Units." Beach sand, Borrow area, Gravel pits, Made land, and Marsh were not placed in tree planting groups.

Shrub and Vine Plantings [5]

The soils in Lake County have been placed in five shrub and vine planting groups. These groupings are for soils in their natural state and do not apply to disturbed soils, such as those near residences. Table 10, page 72, gives information that will be useful in selecting shrubs and vines for planting on the soils of each group. The names of the soil series represented are mentioned in the description of each group, but this does not mean that all the soils in a given series are in the group. The shrub and vine planting classification of each individual soil is given in the "Guide to Mapping Units." Beach sand, Borrow area, Gravel pits, Made land, and Marsh were not placed in shrub and vine planting groups.

[4] Developed by CLARK W. RINKER, woodland conservationist, Soil Conservation Service, Champaign, Ill.

[5] Developed by ROBERT K. LAWSON, conservation agronomist, and VIRGIL HAWK, plant materials specialist, Soil Conservation Service.

TABLE 9.—*Guide for forest, ornamental, and windbreak tree plantings*

[The tree-planting classification of each individual soil is shown in the "Guide to Mapping Units." Beach sand, Borrow area, Gravel pits, Made land, and Marsh were not placed in tree planting groups]

Tree planting group	Forest plantings	Ornamental plantings	Windbreak plantings
1. Silt loam; well drained to somewhat poorly drained; moderate to slow permeability (Aptakisic, Barrington, Beecher, Corwin, Del Rey, Dresden, Elliott, Fox, Frankfort, Grays, Hennepin, Markham, Martinton, Miami, Montmorenci, Morley, Mundelein, Nappanee, Odell, Saylesville, Varna, Wauconda, and Zurich series).	In sheltered coves, on north and east slopes, and on dissected topography: white oak, red oak, European larch, white pine, red pine. On exposed ridges, on south and west slopes, and on open level terrain: red pine, white pine,Scotch pine.	Trees less than 30 feet high at maturity: American hornbeam, Amur maple, redbud, American arborvitae, crabapple. Trees 30 to 60 feet high at maturity: corktree, littleleaf linden, shingle oak, Colorado blue spruce, birch. Trees more than 60 feet high at maturity: red oak, sycamore, hackberry, sugar maple, ginkgo, white ash, Norway spruce, white spruce, Douglas-fir, white fir, pin oak, red maple.	Norway spruce, red pine, white pine, Douglas-fir, eastern redcedar, white spruce.
2. Silt loam; somewhat poorly drained, slow permeability (Frankfort and Nappanee series).	Sycamore, green ash, red maple, silver maple.	Trees less than 30 feet high at maturity: American arborvitae, European alder, eastern redcedar, crabapple. Trees 30 to 60 feet high at maturity: willow, birch, moraine locust, northern white-cedar, aspen. Trees more than 60 feet high at maturity: silver maple, sycamore, green ash, Lombardy poplar, white spruce, black spruce, Norway spruce, pin oak, red maple.	Willow, northern white-cedar, eastern redcedar, Russian-olive.
3. Silty clay loam, silty clay; drained; water table below a depth of 3 feet, except during wet seasons; on lowlands (Ashkum, Harpster, Montgomery, and Pella series).	Cottonwood, sycamore	Trees less than 30 feet high at maturity: European alder. Trees 30 to 60 feet high at maturity: willow, birch. Trees more than 60 feet high at maturity: silver maple, sycamore, pin oak, red maple.	Willow, Russian-olive.
4. Loam, sandy loam, gravelly loam, sand; droughty (Boyer, Casco, Plainfield, and Rodman series).	In sheltered coves, on north and east slopes, and on dissected topography: white pine, red pine, Scotch pine. On exposed ridges, on south and west slopes, and on flat open terrain: red pine, Scotch pine, eastern redcedar.	Trees less than 30 feet high at maturity: eastern redcedar. Trees 30 to 60 feet high at maturity: hackberry. Trees more than 60 feet high at maturity: black oak, bur oak, white oak.	Red pine, eastern redcedar.
5. Silty clay loam; very poorly drained; depressional; water table at surface or within 3 feet of it, except in dry seasons; on bottom lands (Peotone and Sawmill series).	Pin oak, swamp white oak, ash, cottonwood, silver maple.	Trees less than 30 feet high at maturity: European alder. Trees 30 to 60 feet high at maturity: willow. Trees more than 60 feet high at maturity: pin oak, ash, silver maple.	Almondleaf willow, ash.
6. Muck, peat, silty clay loam, loamy fine sand; water table within 3 feet of the surface most of the year (Granby, Houghton, and Peotone series).[1]	Not suitable for forest plantings	Willow	Willow.

[1] These soils should be left in their natural state. Planting is difficult, and survival of most species is very poor.

TABLE 10.—*Guide for shrub and vine plantings*

[The shrub and vine classification of each individual soil is shown in the "Guide to Mapping Units." Beach sand, Borrow area, Gravel pits, Made land, and Marsh were not placed in shrub and vine planting groups]

Shrub and vine planting group	Plant	Plant characteristics					Suitable for planting in—
		Height	Form	Tolerance to—		Other	
				Sun	Shade		
1. Silt loam; nearly level to strongly sloping; well drained to moderately well drained; good available moisture capacity; on uplands (Barrington, Corwin, Grays, Markham, Miami, Montmorenci, Morley, Saylesville, Varna, and Zurich series).	Shrub:	*Ft.*					
	Blackhaw	15–50	Thicket	Good	Good	Slow growing	Pond areas; wildlife borders.
	Manchu cherry	3–6	Thicket	Good	Good	Stands little competition.	Wildlife borders.
	Coralberry	4–6	Thicket	Good	Good	May spread to pasture.	Gullies and road cuts; wildlife borders.
	Siberian crabapple.	20–30	Thicket	Good	Good	Good wildlife food	Pond areas; wildlife borders.
	Highbush cranberry.	6–10	Thicket	Good	Good	Slow growing; good wildlife food.	Hedges; pond areas; shelterbelts and windbreaks; wildlife borders.
	Gray dogwood	4–8	Thicket	Good	Poor	Slow growing; good wildlife food.	Hedges; pond areas; wildlife borders.
	Greystem dogwood.	8–12	Thicket	Good	Poor	Produces abundant fruit.	Hedges; pond areas; wildlife borders.
	Silky dogwood	6–12	Thicket	Good	Good	Good border plants; good wildlife food.	Hedges; pond areas; streambanks; wildlife borders.
	American hazelnut.	8–10	Thicket	Good	Poor	Hybrid varieties produce the best nuts.	Hedges; pond areas; wildlife borders.
	Amur honeysuckle	8–16	Thicket	Good	Good	Good wildlife food	Hedges; gullies and road cuts; pond areas; shelterbelts and windbreaks; wildlife borders.
	Tartarian honeysuckle.	6–12	Thicket	Good	Good	Good wildlife food	Hedges; gullies and road cuts; pond areas; shelterbelts and windbreaks; wildlife borders.
	Indigobush	4–20	Thicket	Good	Good	Good for controlling erosion.	Gullies and road cuts; ground cover.
	Nannyberry	25–30	Thicket	Good	Good	Slow growing	Pond areas; wildlife borders.
	Autumn olive	8–14	Thicket	Good	Good	Produces yellow flowers and red fruit; good wildlife food.	Hedges; pond areas; shelterbelts and windbreaks; wildlife borders.
	Wild plum	10–30	Thicket, thorny.	Good	Poor	Very hardy; good wildlife cover.	Pond areas; shelterbelts and windbreaks; wildlife borders.
	Multiflora rose	6–10	Thicket, thorny.	Good	Poor	Requires good management; may spread to pasture.	Hedges; gullies and road cuts; pond areas; shelterbelts and windbreaks; wildlife borders.
	Rugosa rose	4–6	Thicket, thorny.	Good	Poor	Not suitable for living fence.	Gullies and road cuts.
	Raspberry	4–6	Thorny	Good	Poor	Produces fruit	Wildlife borders.
	Blackberry	4–6	Thorny	Good	Poor	Produces fruit	Wildlife borders.
	Vine:						
	Trumpetcreeper		Climbing	Good	Poor	Vigorous, fast growing.	Ground cover.
	Wild grape		Climbing	Good	Good	Vigorous; good wildlife food.	Ground cover; wildlife borders.
	Trailing raspberry.		Trailing	Poor	Poor	Ground cover	Ground cover.
	Memorial rose		Trailing	Poor	Poor	Good ground cover	Ground cover.
	American bittersweet.		Climbing	Good	Good	Injurious to trees	Ground cover; wildlife borders.

TABLE 10.—*Guide for shrub and vine plantings*—Continued

Shrub and vine planting group	Plant	Plant characteristics					Suitable for planting in—
		Height	Form	Tolerance to—		Other	
				Sun	Shade		
2. Silty clay loam, silt loam, silty clay, and loamy fine sand. Level or depressional; drained. Nearly level to gently sloping; depth to water table more than 3 feet, except during wet seasons. On uplands (Aptakisic, Ashkum, Beecher, Del Rey, Elliott, Frankfort, Granby, Harpster, Martinton, Montgomery, Mundelein, Nappanee, Odell, Pella, Wauconda, and Zurich series).	Shrub:	*Ft.*					
	Groundcherry	4–6	Thicket	Good	Poor	Screening border	Hedges; streambanks; wildlife borders.
	Arrowwood	10–12	Thicket	Good	Good	Slow growing	Wildlife borders.
	Coralberry	4–6	Thicket	Good	Good	May spread to pasture.	Gullies and road cuts; wildlife borders.
	Siberian crabapple.	20–30	Thicket	Good	Good	Good wildlife food	Pond areas; wildlife borders.
	Highbush cranberry.	6–10	Thicket	Good	Good	Slow growing; good wildlife food.	Hedges; pond areas; shelterbelts and windbreaks; wildlife borders.
	Gray dogwood	4–8	Thicket	Good	Poor	Good wildlife food; slow growing.	Hedges; pond areas; wildlife borders.
	Red-osier dogwood.	6–10	Thicket	Good	Good	Good border plants; good wildlife food.	Hedges; pond areas; streambanks; wildlife borders.
	Silky dogwood	6–12	Thicket	Good	Good	Good border plants; good wildlife food.	Hedges; pond areas; streambanks; wildlife borders.
	Amur honeysuckle	8–16	Thicket	Good	Good	Good wildlife food	Hedges; gullies and road cuts; pond areas; shelterbelts and windbreaks; wildlife borders.
	Tartarian honeysuckle.	6–12	Thicket	Good	Good	Good wildlife food	Hedges; gullies and road cuts; pond areas; shelterbelts and windbreaks; wildlife borders.
	Nannyberry	25–30	Thicket	Good	Good	Slow growing	Pond areas; wildlife borders.
	Wild plum	10–30	Thicket, thorny.	Poor	Poor	Very hardy; good wildlife cover.	Pond areas; shelterbelts and windbreaks; wildlife borders.
	Multiflora rose	6–10	Thicket, thorny.	Good	Poor	Requires good management; may spread to pasture.	Hedges; gullies and road cuts; pond areas; wildlife borders.
	Purple-osier willow.	10–15	Thicket	Good	Poor	Grown from plant cuttings.	Hedges; streambanks.
	Wayfaring-tree	6–12	Thicket	Good	Poor	Winter food	Wildlife borders.
	Raspberry	4–6	Thorny	Good	Poor	Produces fruit	Wildlife borders.
	Blackberry	4–6	Thorny	Good	Poor	Produces fruit	Wildlife borders.
	Autumn olive	10–15	Thicket	Good	Poor	Very hardy; good wildlife food.	Hedges; pond areas; shelterbelts and windbreaks; wildlife borders.
	Vine:						
	Moonseed		Climbing	Good	Good	Fast growing	Ground cover.
	Trumpetcreeper		Climbing	Good	Poor	Vigorous; fast growing.	Ground cover.
	Wild grape		Climbing	Good	Good	Vigorous; good wildlife food.	Ground cover; wildlife borders.

TABLE 10.—*Guide for shrub and vine plantings*—Continued

Shrub and vine planting group	Plant	Plant characteristics					Suitable for planting in—
		Height	Form	Tolerance to—		Other	
				Sun	Shade		
3. Silty clay loam, muck; water table within 3 feet of surface much of the year; on lowlands (Houghton, Peotone, and Sawmill series).	Shrub:	*Ft.*					
	Purple-osier willow.	10–15	Thicket	Good	Poor	Grown from plant cuttings.	Streambanks.
	Silky dogwood	6–12	Thicket	Good	Good	Good border plants; good wildlife food.	Hedges; pond areas; streambanks; wildlife borders.
	Roughleaf dogwood.	8–12	Thicket	Good	Poor	Good border plants.	Pond areas; wildlife borders.
	Red-osier dogwood.	6–10	Thicket	Good	Good	Good border plants; good wildlife food.	Hedges; pond areas; streambanks; wildlife borders.
	Blue Arctic willow.	6–10	Thicket	Poor	Poor	Good border plants.	Streambanks.
4. Silt loam, loam, sandy loam, gravelly loam, and sand; nearly level to steep; tending to be droughty; on uplands; (Boyer, Casco, Dresden, Fox, Hennepin, Markham, Morley, Plainfield, Rodman, Saylesville, and Zurich series).	Shrub:						
	Southern blackhaw.	15–20	Thicket	Good	Good	Slow growing	Hedges; pond areas; wildlife borders.
	Mongolian cherry.	3–6	Thicket	Good	Good	Stands little competition.	Hedges; pond areas; wildlife borders.
	American hazelnut.	8–10	Thicket	Good	Poor	Hybrid varieties produce the best nuts.	Hedges; pond areas; wildlife borders.
	Rochester arborvitae.	25–30	Living wall.	Good	Poor	Suitable for living fence.	Hedges; pond areas; shelterbelts and windbreaks.
	Russian-olive	12–20	Thicket, thorny.	Good	Good	Very hardy	Hedges; shelterbelts and windbreaks.
	Wild plum	10–30	Thicket, thorny.	Poor	Poor	Very hardy; good wildlife cover.	Ground cover; shelterbelts and windbreaks; wildlife borders.
	Rugosa rose	4–6	Thicket, thorny.	Good	Poor	Not suitable for living fence.	Gullies and road cuts.
	Staghorn sumac	25–30	Thicket	Good	Good	Sprouts persistently from roots.	Wildlife borders.
	Washington hawthorn.	25–30	Thicket	Good		Provides nesting for birds.	Pond areas; shelterbelts and windbreaks; wildlife borders.
	Smooth sumac	10–30	Thicket	Good		Suitable for screening.	Ground cover; wildlife borders.
5. Muck, peat, silty clay loam; water table within 3 feet of the surface most of the year (Houghton and Peotone series).[1]							

[1] These soils should remain in native vegetation. Survival of most kinds of plants is very poor.

Use of the Soils for Recreation

Lake County has long been an important vacation area. Now, soil scientists and area planners, together, have developed some guides for future recreational development.

The soils in Lake County have been placed in 10 groups according to their suitability for specified recreational uses. In table 11, page 76, each group is described briefly, and the estimated degree and kind of limitation for the specified uses are given. The names of the soil series represented in each group are listed, but this does not mean that all the soils in those series are in the group. The recreational classification of each individual soil is given in the "Guide to Mapping Units." Borrow area, Gravel pits, and Made land were not placed in recreational groups.

Although the detailed soil map and table 11 are general guides for evaluating most of the soils, a detailed investigation at the site of proposed construction is needed because as much as 15 percent of an area designated on the map as a specific soil may consist of small areas of other soils.

The estimated degrees of limitation shown in table 11 are slight, moderate, severe, and very severe. Slight indicates that the soils are relatively free of limitations or that the limitations are easily overcome. Moderate indicates that the limitations can be overcome by careful planning and good management. Severe or very severe indicates that the use of the soil for that purpose is questionable, that the limitations can be overcome by careful planning and better than average good management in most places, but that in some places overcoming the limitations is not economically feasible.

Formation and Classification of the Soils

This section discusses the factors of soil formation and the classification of the soils in Lake County by higher categories. Laboratory data, when available, have been taken into account but are not published in this survey. Data for the following soils have been published in Illinois Agricultural Experiment Station Bulletin 665 (*15*): Ashkum, Beecher, Elliott, Fox, Frankfort, Miami, and Nappanee (formerly called Eylar) soils.

Factors of Soil Formation

The factors that determine the kind of soil that forms at any given point are the composition of the parent material, the climate under which the soil material accumulated and weathered, the plants and animals on and in the soil, the relief, or lay of the land, and time. Each of these factors modifies the effects of the other four.

Climate and vegetation are the active factors of soil formation. They alter the accumulated soil material and bring about the development of genetically related horizons. Relief, mainly by its influence on temperature and runoff, modifies the effects of climate and vegetation. The parent material also affects the kind of profile that can be formed and, in extreme cases, determines it almost entirely. Finally, time is needed to change the parent material into a soil. Usually a long time is required for the development of distinct horizons.

Parent materials

The parent materials of soils in Lake County are mainly glacial till and outwash and, to a lesser extent, loess, lacustrine material, and organic material.

The glacial till, which is calcareous, consists mainly of loamy gravel, loam, silt loam, silty clay loam, and silty clay and, to a lesser extent, sandy loam and clay (*15*). Table 12 shows the distribution of gravel, sand, silt, and clay in the main textural classes of glacial till.

The outwash ranges from loamy gravel to silty clay in texture. It is generally stratified, and the strata range from a fraction of an inch to many feet in thickness.

The loessal deposits are generally thin and are difficult to identify because they are mixed with other materials. They consist mainly of silt, but they may contain small amounts of clay and fine sand. They originated mainly on the bottom lands along large streams and on valley trains of glacial rivers. These deposits are the parent material of most of the somewhat poorly drained to well-drained soils that have an A horizon of silt loam. Only the more recent loess deposits are important as the parent material of present soils.

The organic material consists of the fibrous remains of grass, sedges, rushes, reeds, and creeping mosses that accumulated in shallow water. Peat generally is more than 65 percent organic matter that consists of identifiable, only slightly decomposed plant remains. Muck consists of well decomposed peat and a larger amount of mineral material. In some places, beneath the peat that formed in fibrous remains there is peat that formed in the remains of aquatic plants that had accumulated in deep water. Underlying the peat and muck is mineral material ranging from sand to silty clay in texture, but most of the mineral material is medium textured.

The parent material of the soils in associations 1, 2, 3, and 9 is mostly outwash, and that of the soils in the other associations is mostly glacial till. As much as 10 to 12 percent of the acreage in some associations consists of peat and muck, which is scattered through the associations. The soil associations are described in the section "General Soil Map."

Plants and animals

Plants, micro-organisms, earthworms, and other forms of life that live on or in the soil are active in the soil-forming processes. As plants die and decay, they contribute organic matter to the soils. Bacteria and fungi promote the decomposition of plant remains and the incorporation of organic matter into the soils. Burrowing animals help to loosen the soil.

Organic matter accumulates in the soils that are under grass, and it accumulates on the surface of the soils that are under forest vegetation. Soils under forest vegetation develop more rapidly than those under grass, possibly because the more complete decomposition outside the soil produces more chelating substances, which promote the downward movement of iron and aluminum.

TABLE 11.—*Estimated degree and kind of*

[The recreational classification of each individual soil is shown in the "Guide to Mapping

Recreational group	Cottages and utility buildings (septic tanks not considered)	Campsites for tents and trailers
1. Silt loam; well drained to somewhat poorly drained; moderate to slow permeability; nearly level to gently sloping (Barrington, Corwin, Grays, Markham, Miami, Montmorenci, Morley, Nappanee, Saylesville, Varna, and Zurich series).	Slight	Slight
2. Silt loam; somewhat poorly drained; moderate to slow permeability; nearly level to gently sloping (Aptakisic, Beecher, Del Rey, Elliott, Frankfort, Martinton, Mundelein, Nappanee, Odell, and Wauconda series).	Moderate: subject to frost heave; moderate shrink-swell potential.	Moderate: seasonal high water table; slow to dry out.
3. Silty clay loam, silty clay, and loamy fine sand; poorly drained; mainly moderate to slow permeability; level and depressional (Ashkum, Granby, Harpster, Montgomery, Pella, Peotone, and Sawmill series).	Severe: water table near surface; subject to flooding and ponding.	Severe: muddy when wet; subject to flooding and ponding.
4. Loam and sandy loam; well drained to excessively drained; moderate to rapid permeability; nearly level to gently sloping (Boyer, Dresden, and Fox series).	Slight	Slight
5. Silt loam; well drained; moderate to moderately slow permeability; moderately sloping to strongly sloping (Markham, Miami, Morley, and Zurich series).	Moderate: slope	Slight to moderate: slope, in some places; erosion hazard.
6. Silt loam, loam, and sandy loam; well drained; slow to rapid permeability; moderately sloping to strongly sloping; eroded (Boyer, Casco, Fox, Markham, Miami, Montmorenci, Morley, Nappanee, Saylesville, and Zurich series).	Moderate: slope	Moderate: slope; eroded soils
7. Silt loam; somewhat poorly drained; slow permeability; plastic; nearly level to gently sloping (Frankfort and Nappanee series).	Moderate: slow permeability; moderate shrink-swell potential; subject to frost heave.	Moderate: seasonal high water table; slow permeability; slow to dry out.
8. Muck, peat, and silty clay loam; wet; low lying; unstable (Houghton and Peotone series, Marsh).	Very severe: unstable; wet	Very severe: unstable; wet
9. Silt loam, loam, and gravelly loam; steep; well drained (Hennepin, Rodman, and Morley series).	Severe: slope; erosion hazard	Severe: slope; erosion hazard
10. Sand; subject to wind erosion (Plainfield series, Beach sand)	Moderate: loose sand; wind erosion hazard; topdressing necessary for vegetation.	Moderate: loose sand; wind erosion hazard.

limitation for recreational uses

Units." Borrow area, Gravel pits, and Made land were not placed in these groups]

Picnic areas, parks, and extensive play areas	Playgrounds, athletic fields, and intensive play areas	Paths and trails	Golf fairways
Slight	Slight for 0 to 2 percent slopes. Moderate for 2 to 4 percent slopes.	Slight	Slight.
Moderate: seasonal high water table; slow to dry out.	Moderate: seasonal high water table; slow to dry out; slopes of 2 to 4 percent.	Moderate: moisture held over long periods of time.	Moderate: slow to dry out.
Moderate to severe: muddy when wet; subject to flooding and ponding.	Severe: muddy when wet; high water table; subject to flooding and ponding.	Moderate: muddy when wet; slow to dry out.	Severe: slow to dry out; turf easily damaged when wet; subject to flooding and ponding.
Slight	Slight for 0 to 2 percent slopes. Moderate for 2 to 4 percent slopes. Irrigation may be necessary for maintenance of grass in summer.	Slight	Slight: irrigation may be necessary for turf in summer.
Slight to moderate: slope, in some places.	Severe: slope; erosion hazard	Slight to moderate: slope, in some places.	Moderate: slope; bare spots erode easily.
Moderate: slope; eroded soils	Severe: slope; eroded soils; muddy when wet.	Moderate: slope; eroded soils; difficult to establish vegetation.	Moderate: slope; topdressing often necessary for good turf.
Moderate: seasonal high water table; slow to dry out; vegetation difficult to establish.	Moderate: slow permeability; slow to dry out; some irrigation necessary in summer; slope where more than 2 percent.	Moderate: slow to dry out; seasonal high water table.	Moderate: soft in wet weather; irrigation necessary in summer.
Very severe: wet; unstable	Very severe: wet; unstable	Severe: wet; standing water in most places; unstable; good wetland wildlife areas.	Very severe: wet in most places; subject to ponding; unstable.
Severe: slope; droughty in some areas.	Severe: slope; erosion hazard; droughty in some areas.	Moderate to severe: slope	Severe: slope; erosion hazard; droughty in some areas.
Moderate: loose sand; wind erosion hazard.	Severe: droughty; loose sand; wind erosion hazard; difficult to establish and maintain vegetation.	Moderate: loose sand; lacks firm surface when dry.	Severe: loose sand; droughty; topdressing and irrigation necessary for turf.

TABLE 12.—*Distribution of particle sizes in specified textures of glacial till in Lake County*

[Data obtained from counties in northeastern Illinois (*15*)]

Texture of glacial till	Gravel		Sand		Silt		Clay	
	Average	Range	Average	Range	Average	Range	Average	Range
	Pct.	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*	*Pct.*
Loamy gravel [1]	65. 2	31. 9–82. 2	30. 9	15. 5–64. 6	4. 8	1. 0–14. 4	1. 5	0. 3– 7. 8
Loam and silt loam	7. 5	4. 3–16. 2	24. 0	14. 0–30. 3	46. 0	36. 5–54. 2	20. 7	14. 3–25. 5
Silty clay loam	4. 1	0. 1–14. 0	12. 0	3. 8–16. 3	52. 5	45. 5 65. 1	31. 3	24. 3–36. 4
Silty clay	2. 8	0. 1– 6. 7	10. 0	1. 4–15. 9	47. 2	38. 9–53. 6	39. 7	34. 7–44. 9

[1] Includes water-sorted material.

The native vegetation in Lake County consisted of grass and forest. The soils that formed under grass are darker colored than those that formed under forest vegetation and have a different sequence of horizons. Virgin soils that formed under grass have a 10- to 15-inch A1 horizon but no A2 horizon. Soils that formed under forest vegetation have a 1- to 5-inch A1 horizon and a light-colored A2 horizon. Soils that formed in transitional areas where forest is encroaching on grass have a 5- to 10-inch A1 horizon and a light-colored A2 horizon.

The soils in associations 2, 4, and 6 are mainly under grass, and those in the other associations are mainly under forest or transitional vegetation. The soil associations are described in the section "General Soil Map."

In the following ways, soil formation has been greatly affected by the activities of man. The kind of vegetation has been changed by clearing forested areas and seeding them to crops. Erosion in sloping areas and deposition of soil materials in low areas have been hastened by cultivating sloping soils. The natural condition of the soils has been altered by draining wet soils, irrigating dry soils, applying lime to acid soils, and applying large amounts of fertilizer. The beginning of a new cycle of soil formation has been forced in places where much grading has destroyed soil profiles or much filling has covered them.

Relief

In Lake County, relief influences the formation of soils mainly through its effect on drainage. In general, sloping soils are better drained than soils in low-lying areas and nearly level but coarse-textured soils are better drained than more sloping but fine-textured soils.

The degree of drainage governs the oxidation and hydration of certain mineral compounds, mainly iron. In general, well-drained soils are well oxidized and poorly drained soils are poorly oxidized. The degree of oxidation and hydration, in turn, determines the brown, yellowish-brown, and gray colors in soils that have not been darkened by organic matter. There are brown (10YR 5/3) and yellowish-brown (10YR 5/4 and 5/8) colors in the subsoil of well-drained soils that have a low water table; gray and brown mottles in the subsoil of moderately well drained to somewhat poorly drained soils that have a fluctuating water table; and gray (10YR 5/1) to dark-gray (10YR 4/1) matrix colors and a few yellowish-brown (10YR 5/4 and 5/6) mottles in the subsoil of poorly drained soils that have a high water table.

Climate

Climate affects soil formation through its effect on weathering, on vegetation, and on erosion. Freezing and thawing help to break down minerals and rock fragments. Wind causes duststorms and the shifting of sand dunes. Water received as rainfall percolates downward in soils that have favorable slope and permeability and carries with it bases and clay. The bases and clay accumulate in the lower soil horizons. Among the bases that accumulate are calcium, magnesium, and potassium. The clay has properties that are quite different from the original soil material.

Lake County has a humid temperate climate that has been favorable for soil development. Both rainfall and temperature have been such as to encourage the growth of grass and trees. Enough water has percolated through the soils to cause the downward movement of fine particles, colloids, and soluble minerals. Consequently, most of the soils have a greater proportion of silicon in the surface layer, an accumulation of clay in the subsoil, and an acid reaction.

Time

Time is necessary for the formation of soil from parent material. Normally a long period is required for formation of soils that have distinct, well-expressed horizons, but the length of time is largely dependent on the combined action of the other soil-forming factors. For example, more time is required if the parent material is fine textured than if it is coarse textured, because of the slow percolation of water in fine-textured material and the consequent slower leaching of lime out of the soil. Because they have had less time for the leaching of carbonates to take place, the soils in Lake County that formed in glacial till on stable sites are younger than the soils that formed in similar parent material on stable sites 100 miles to the south.

Geologically, the soils in Lake County are young. They formed in glacial material deposited about thirteen thousand years ago. Some of this material has since been reworked by wind and water, especially that near Lake Michigan and that along the Fox River and the Des Plaines River.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics, assemble knowledge about

them, see their relationships to one another, and understand their behavior and their response to the whole environment. Through classification and use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

Two systems of classifying soils above the series level have been used in the United States in recent years. The older system was adopted in 1938 (*2*) and revised later (*10*). The system currently used by the National Cooperative Soil Survey was adopted in 1965 and is under continual study. Readers interested in the development of the system should refer to the latest literature available (*9, 12*).

The current system consists of six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family, and the series. The criteria for classification are soil properties that are measurable or observable, but the properties are selected so that soils of similar genesis are grouped together. Placement of some series in the current system of classification, particularly in families, may change as more precise information becomes available.

Table 13 shows the classification of the soil series in Lake County according to the current system and the great soil group according to the 1938 system. The categories of the current system are defined briefly in the following paragraphs.

ORDER.—Soils are grouped into orders according to properties that seem to have resulted from the same processes acting to about the same degree on the parent material. Ten soil orders are recognized in the current sys-

TABLE 13.—*Soil series in Lake County classified into higher categories*

Series	Current classification			Great soil group, 1938 classification
	Family	Subgroup	Order	
Aptakisic	Fine-silty, mixed, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Ashkum	Fine, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols	Humic Gley soils.
Barrington	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.
Beecher	Fine, illitic, mesic	Udollic Ochraqualfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brunizems.
Boyer	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Casco	Fine-loamy over sandy or sandy skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Corwin	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols	Brunizems.
Del Rey	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Dresden	Fine-loamy over sandy or sandy skeletal, mixed, mesic.	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brunizems.
Elliott	Fine, illitic, mesic	Aquic Argiudolls	Mollisols	Brunizems.
Fox	Fine-loamy over sandy or sandy skeletal, mixed, mesic.	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Frankfort	Fine, illitic, mesic	Udollic Ochraqualfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brunizems.
Granby	Sandy, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols	Humic Gley soils.
Grays	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brunizems.
Harpster	Fine-silty, mixed, mesic	Typic Calciaquolls	Mollisols	Humic Gley soils.
Hennepin	Fine-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols	Regosols.
Houghton	Euic, mesic	Typic Medisaprists	Histosols	Bog soils.
Markham	Fine, illitic, mesic	Mollic Hapludalfs	Alfisols	Gray-Brown Podzolic soils intergrading to Brunizems.
Martinton	Fine, illitic, mesic	Aquic Argiudolls	Mollisols	Brunizems.
Miami	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Montgomery	Fine, mixed, noncalcareous, mesic	Typic Haplaquolls	Mollisols	Humic Gley soils.
Montmorenci	Fine-loamy, mixed, mesic	Aquallic Hapludalfs	Alfisols	Gray-Brown Podzolic soils. intergrading to Brunizems.
Morley	Fine, illitic, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Mundelein	Fine-silty, mixed, mesic	Aquic Argiudolls	Mollisols	Brunizems.
Nappanee	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols	Gray-Brown Podzolic soils.
Odell	Fine-loamy, mixed, mesic	Aquic Argiudolls	Mollisols	Brunizems.
Pella	Fine-silty, mixed, noncalcareous, mesic.	Typic Haplaquolls	Mollisols	Humic Gley soils.
Peotone	Fine, montmorillonitic, noncalcareous, mesic.	Cumulic Haplaquolls	Mollisols	Humic Gley soils.
Plainfield, slightly acid variant.	Sandy, mixed, mesic	Typic Udipsamments	Entisols	Gray-Brown Podzolic soils intergrading to Regosols.
Rodman	Sandy skeletal, mixed, mesic	Typic Hapludolls	Mollisols	Regosols.
Sawmill	Fine-silty, mixed, noncalcareous, mesic.	Cumulic Haplaquolls	Mollisols	Humic Gley soils.
Saylesville	Fine, illitic, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.
Varna	Fine, illitic, mesic	Typic Argiudolls	Mollisols	Brunizems.
Wauconda	Fine-silty, mixed, mesic	Udollic Ochraqualfs	Alfisols	Gray-Brown Podzolic soils. intergrading to Brunizems.
Zurich	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols	Gray-Brown Podzolic soils.

tem: Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The Entisols, Inceptisols, Mollisols, Alfisols, and Histosols are represented in Lake County.

Entisols are recent soils in which there has been little, if any, horizon development. Inceptisols occur mostly on young, but not recent, land surfaces. Mollisols have a thick, dark-colored surface layer, moderate to strong structure, and base saturation of more than 50 percent. Alfisols contain accumulated aluminum and iron, have argillic or natric horizons, and have a base saturation of more than 35 percent. Histosols are organic soils, but the criteria by which they are to be classified into categories higher than the series are still under consideration.

SUBORDER.—Each order is divided into suborders, primarily on the basis of soil characteristics that indicate genetic similarity. The suborders have a narrower climatic range than the order. The criteria for suborders reflect either the presence or absence of waterlogging, or soil differences resulting from climate or vegetation.

GREAT GROUP.—Each suborder is divided into great groups, on the basis of uniformity in kind and sequence of genetic horizons. The great group is not shown in table 13, because the name of the great group is the same as the last word in the name of the subgroup.

SUBGROUP.—Each great group is divided into subgroups, one representing the central (typic) concept of the group, and others, called intergrades, made up of soils that have mostly the properties of one great group but also one or more properties of another great group.

FAMILIES.—Families are established within subgroups, primarily on the basis of properties important to plant growth. Some of these properties are texture, mineralogy, reaction, soil temperature, permeability, consistence, and thickness of horizons.

SERIES.—The series has the narrowest range of characteristics of the categories in the classification system. It is explained in the section "How This Survey Was Made."

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Glossary

Acidity. *See* Reaction, soil.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as crumbs, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available moisture capacity. The capacity of a soil to hold water that can be used by plants. Water held between the wilting point (15 atmospheres of tension) and the field capacity (1/3 atmosphere). Classes of available moisture capacity in this survey are the following (to a depth of 60 inches):

Very high—12 inches or more.
High—9 to 12 inches.
Moderate—6 to 9 inches.
Low—3 to 6 inches.
Very low—less than 3 inches.

Calcareous soil. A soil that contains enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Contour farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or parallel to the terrace grade.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Cover crop. A close-growing crop grown primarily to improve and to protect the soil between periods of regular crop production; or a crop grown between trees and vines in orchards and vineyards.

Depth of soil. Thickness of soil over a specified layer, generally one that does not permit the growth of roots. Classes used in this survey are—

Deep—36 inches or more.	*Shallow*—10 to 20 inches.
Moderately deep—20 to 36 inches.	*Very shallow*—less than 10 inches.

Diversion, or diversion terrace. A ridge of earth, generally a terrace that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Gleyed soil. A soil in which waterlogging and lack of oxygen have caused the material in one or more horizons to be neutral gray in color. The term "gleyed" is applied to soil horizons with yellow and gray mottling caused by intermittent waterlogging.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from cropland.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residues.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of the following: soluble salts, clay, and sesquioxides (iron and aluminum oxides).

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that from which the overlying horizons were formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Lime concretion. An aggregate cemented by the precipitation of calcium carbonate ($CaCO_3$).

Mottled. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of drainage. Descriptive terms are as follows: Abundance—*few, common,* and *many;* size—*fine, medium,* and *coarse;* and contrast—*faint, distinct,* and *prominent.* The size measurements are these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Natural soil drainage. Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and have mottling in the lower B and the C horizons.

Imperfectly or somewhat poorly drained soils are wet for significant periods but not all the time, and commonly have mottling in the lower A horizon and in the B and C horizons.

Poorly drained soils are wet for long periods and are light gray and are generally, but not invariably, mottled from the surface downward.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Organic matter (content). A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition. Ratings used in this survey have the following limits: Very low—less than 1 percent of volume; low—1 to 2 percent; moderate—2 to 4 percent; and high—more than 4 percent.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality of a soil horizon that enables water or air to move through it. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Phase, soil. A subdivision of a soil series, or other unit in the soil classification system made because of differences in the soil that affect its management but do not affect its classification in the natural landscape. A soil type, for example, may be divided into phases because of differences in slope, stoniness, thickness, or some other characteristic that affects its management but not its behavior in the natural landscape.

Poorly graded. A soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles in poorly graded soil material, density can be increased only slightly by compaction.

Porosity, soil. The degree to which the soil mass is permeated with pores or cavities.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. As a soil separate, individual rock or mineral fragments ranging from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz, but sand may be of any mineral composition. As a textural class, soil that is 85 percent or more sand and not more than 10 percent clay.

Series, soil. A group of soils that developed from a particular type of parent material and have genetic horizons that, except for texture of the surface layer, are similar in differentiating characteristics and in arrangement in the profile.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a textural class, soil that is 80 percent silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief, over periods of time.

Stripcropping. Growing crops in a systematic arrangement of strips, or bands, to serve as vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are (1) *single grain* (each grain by itself, as in dune sand) or (2) *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the profile below plow depth.

Substratum. Technically, the part of the soil below the solum.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Includes the A horizon and part of the B horizon; has no depth limit.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surplus runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay*, and *clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Type, soil. A subdivision of the soil series that is made on the basis of differences in the texture of the surface layer.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and that of the soil series to which the mapping unit belongs. Other information is given in tables as follows:

Acreage and extent, table 4, page 11.
Estimated yields, table 5, page 45.
Wildlife groups, table 6, page 47.
Engineering uses of the soils, table 7, page 50; table 8, page 56.
Tree planting groups, table 9, page 71.
Shrub and vine planting groups, table 10, page 72.
Recreational groups, table 11, page 76.

Map symbol	Mapping unit	Described on page	Management group: Symbol	Management group: Page	Wildlife group: Number	Tree planting group: Number	Shrub and vine planting group: Number	Recreational group: Number
25F	Hennepin loam, 15 to 30 percent slopes	23	VIe-1	43	4	1	4	9
25G	Hennepin loam, 30 to 60 percent slopes	23	VIIe-1	43	4	1	4	9
27B	Miami silt loam, 2 to 4 percent slopes	26	IIe-1	41	1	1	1	1
27C	Miami silt loam, 4 to 7 percent slopes	27	IIe-1	41	1	1	1	5
27C2	Miami silt loam, 4 to 7 percent slopes, eroded	27	IIIe-1	42	1	1	1	6
27D	Miami silt loam, 7 to 12 percent slopes	27	IIIe-1	42	1	1	1	5
27D2	Miami silt loam, 7 to 12 percent slopes, eroded	27	IVe-2	43	1	1	1	6
V54	Plainfield sand, slightly acid variant, 1 to 4 percent slopes	34	VIIs-1	43	4	4	4	10
57B	Montmorenci silt loam, 2 to 4 percent slopes	28	IIe-1	41	1	1	1	1
57C2	Montmorenci silt loam, 4 to 7 percent slopes, eroded	28	IIIe-1	42	1	1	1	6
67	Harpster silty clay loam	22	IIw-2	41	5	3	2	3
93F	Rodman gravelly loam, 15 to 50 percent slopes	35	VIIs-1	43	4	4	4	9
W97	Houghton peat, wet	23	VIIIw-1	44	6	6	5	8
103	Houghton muck	23	IIIw-4	43	5	6	3	8
W103	Houghton muck, wet	23	VIIIw-1	44	6	6	5	8
107	Sawmill silty clay loam	35	IIw-3	42	5	5	3	3
146A	Elliott silt loam, 0 to 2 percent slopes	19	IIw-1	41	2	1	2	2
146B	Elliott silt loam, 2 to 4 percent slopes	19	IIe-2	41	2	1	2	2
153	Pella silty clay loam	33	IIw-2	41	3	3	2	3
189A	Martinton silt loam, 0 to 2 percent slopes	26	IIw-1	41	2	1	2	2
189B	Martinton silt loam, 2 to 4 percent slopes	26	IIe-2	41	2	1	2	2
192A	Del Rey silt loam, 0 to 2 percent slopes	17	IIw-1	41	3	1	2	2
192B	Del Rey silt loam, 2 to 4 percent slopes	17	IIe-2	41	3	1	2	2
194B	Morley silt loam, 2 to 4 percent slopes	29	IIe-3	41	1	1	1	1
194B2	Morley silt loam, 2 to 4 percent slopes, eroded	29	IIIe-1	42	1	1	1	6
194C	Morley silt loam, 4 to 7 percent slopes	29	IIIe-1	42	1	1	1	5
194C2	Morley silt loam, 4 to 7 percent slopes, eroded	29	IVe-2	43	1	1	4	6
194D	Morley silt loam, 7 to 12 percent slopes	29	IIIe-1	42	1	1	1	5

Map symbol	Mapping unit	Described on page	Management group Symbol	Management group Page	Wildlife group Number	Tree planting group Number	Shrub and vine planting group Number	Recreational group Number
194D2	Morley silt loam, 7 to 12 percent slopes, eroded--------------------	29	IVe-2	43	4	1	4	6
194E	Morley silt loam, 12 to 25 percent slopes---------------------------	29	VIe-1	43	1	1	4	9
194E2	Morley silt loam, 12 to 25 percent slopes, eroded--------------------	29	VIIe-1	43	4	1	4	9
232	Ashkum silty clay loam--------------	13	IIw-2	41	3	3	2	3
228A	Nappanee silt loam, 0 to 2 percent slopes---------------------------	31	IIIw-1	42	3	2	2	7
228B	Nappanee silt loam, 2 to 4 percent slopes---------------------------	31	IIIe-2	42	3	2	2	7
228C2	Nappanee silt loam, 4 to 7 percent slopes, eroded-------------------	31	IVe-2	43	3	2	2	6
298A	Beecher silt loam, 0 to 2 percent slopes---------------------------	14	IIw-1	41	3	1	2	2
298B	Beecher silt loam, 2 to 4 percent slopes---------------------------	15	IIe-2	41	3	1	2	2
320A	Frankfort silt loam, 0 to 2 percent slopes---------------------------	20	IIIw-1	42	3	2	2	7
320B	Frankfort silt loam, 2 to 4 percent slopes---------------------------	20	IIIe-2	42	3	2	2	7
323C2	Casco loam, 3 to 10 percent slopes, eroded---------------------------	16	VIe-1	43	4	4	4	6
325A	Dresden loam, 0 to 2 percent slopes-	18	IIs-1	42	4	1	4	4
325B	Dresden loam, 2 to 4 percent slopes-	18	IIe-4	41	4	1	4	4
327A	Fox loam, 0 to 2 percent slopes-----	19	IIs-1	42	4	1	4	4
327B	Fox loam, 2 to 4 percent slopes-----	19	IIe-4	41	4	1	4	4
327C2	Fox loam, 4 to 7 percent slopes, eroded---------------------------	19	IVe-1	43	4	1	4	6
327D2	Fox loam, 7 to 12 percent slopes, eroded---------------------------	20	IVe-1	43	4	1	4	6
330	Peotone silty clay loam-------------	33	IIw-3	42	5	5	3	3
W330	Peotone silty clay loam, wet--------	33	VIIw-1	43	6	6	5	8
365	Aptakisic silt loam-----------------	12	IIw-1	41	2	1	2	2
367	Beach sand--------------------------	14	VIIIs-1	44	None	None	None	10
370B	Saylesville silt loam, 1 to 4 percent slopes----------------------	36	IIe-3	41	1	1	1	1
370C2	Saylesville silt loam, 4 to 7 percent slopes, eroded---------------	36	IVe-2	43	1	1	4	6
442A	Mundelein silt loam, 0 to 2 percent slopes---------------------------	30	I-2	40	2	1	2	2
442B	Mundelein silt loam, 2 to 4 percent slopes---------------------------	30	IIe-2	41	2	1	2	2
443A	Barrington silt loam, 0 to 2 percent slopes----------------------	14	I-1	40	1	1	1	1
443B	Barrington silt loam, 2 to 4 percent slopes----------------------	14	IIe-1	41	1	1	1	1
465	Montgomery silty clay---------------	27	IIIw-3	43	5	3	2	3
490A	Odell silt loam, 0 to 2 percent slopes---------------------------	32	I-2	40	2	1	2	2
490B	Odell silt loam, 2 to 4 percent slopes---------------------------	32	IIe-2	41	2	1	2	2
495A	Corwin silt loam, 0 to 2 percent slopes---------------------------	16	I-1	40	1	1	1	1
495B	Corwin silt loam, 2 to 4 percent slopes---------------------------	17	IIe-1	41	1	1	1	1
513	Granby loamy fine sand--------------	21	IIIw-2	43	5	6	2	3
531B	Markham silt loam, 1 to 4 percent slopes---------------------------	25	IIe-3	41	1	1	1	1

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Management group Symbol	Management group Page	Wildlife group Number	Tree planting group Number	Shrub and vine planting group Number	Recreational group Number
531B2	Markham silt loam, 2 to 4 percent slopes, eroded	25	IIIe-1	42	1	1	1	6
531C	Markham silt loam, 4 to 7 percent slopes	25	IIIe-1	42	1	1	1	5
531C2	Markham silt loam, 4 to 7 percent slopes, eroded	25	IIIe-1	42	1	1	1	6
531D2	Markham silt loam, 7 to 12 percent slopes, eroded	25	IVe-2	43	4	1	4	6
696A	Zurich silt loam, 0 to 2 percent slopes	38	I-1	40	1	1	1	1
696B	Zurich silt loam, 2 to 4 percent slopes	38	IIe-1	41	1	1	1	1
696C	Zurich silt loam, 4 to 7 percent slopes	39	IIe-1	41	1	1	1	5
696C2	Zurich silt loam, 4 to 7 percent slopes, eroded	39	IIIe-1	42	1	1	1	6
696D2	Zurich silt loam, 7 to 15 percent slopes, eroded	39	IVe-2	43	4	1	4	6
697A	Wauconda silt loam, 0 to 2 percent slopes	37	I-2	40	2	1	2	2
697B	Wauconda silt loam, 2 to 4 percent slopes	37	IIe-2	41	2	1	2	2
698A	Grays silt loam, 0 to 2 percent slopes	21	I-1	40	1	1	1	1
698B	Grays silt loam, 2 to 4 percent slopes	21	IIe-1	41	1	1	1	1
706B	Boyer sandy loam, 1 to 4 percent slopes	15	IIs-1	42	4	4	4	4
706C2	Boyer sandy loam, 4 to 10 percent slopes, eroded	15	IVe-1	43	4	4	4	6
978A	Wauconda and Beecher silt loams, 0 to 2 percent slopes	37	I-2	40	2	1	2	2
978B	Wauconda and Beecher silt loams, 2 to 4 percent slopes	37	IIe-2	41	2	1	2	2
979A	Grays and Markham silt loams, 0 to 2 percent slopes	22	I-1	40	1	1	1	1
979B	Grays and Markham silt loams, 2 to 4 percent slopes	22	IIe-1	41	1	1	1	1
980B	Zurich and Morley silt loams, 2 to 4 percent slopes	39	IIe-1	41	1	1	1	1
980C2	Zurich and Morley silt loams, 4 to 7 percent slopes, eroded	39	IIIe-1	42	1	1	1	6
981A	Wauconda and Frankfort silt loams, 0 to 2 percent slopes	38	IIw-1	41	3	1	2	2
981B	Wauconda and Frankfort silt loams, 2 to 4 percent slopes	38	IIe-2	41	3	1	2	2
982A	Aptakisic and Nappanee silt loams, 0 to 2 percent slopes	12	IIw-1	41	3	1	2	2
982B	Aptakisic and Nappanee silt loams, 2 to 4 percent slopes	12	IIw-1	41	3	1	2	2
983B	Zurich and Nappanee silt loams, 2 to 4 percent slopes	39	IIe-1	41	1	1	2	1
984B	Barrington and Varna silt loams, 2 to 4 percent slopes	14	IIe-1	41	1	1	1	1
989A	Mundelein and Elliott silt loams, 0 to 2 percent slopes	30	1-2	40	2	1	2	2
989B	Mundelein and Elliott silt loams, 2 to 4 percent slopes	30	IIe-2	41	2	1	2	2
MA	Marsh	25	VIIIw-1	44	6	None	None	8
BA	Borrow area	15	None	--	None	None	None	None
ML	Made land	24	None	--	None	None	None	None
GP	Gravel pits	21	None	--	None	None	None	None

Accessibility Statement

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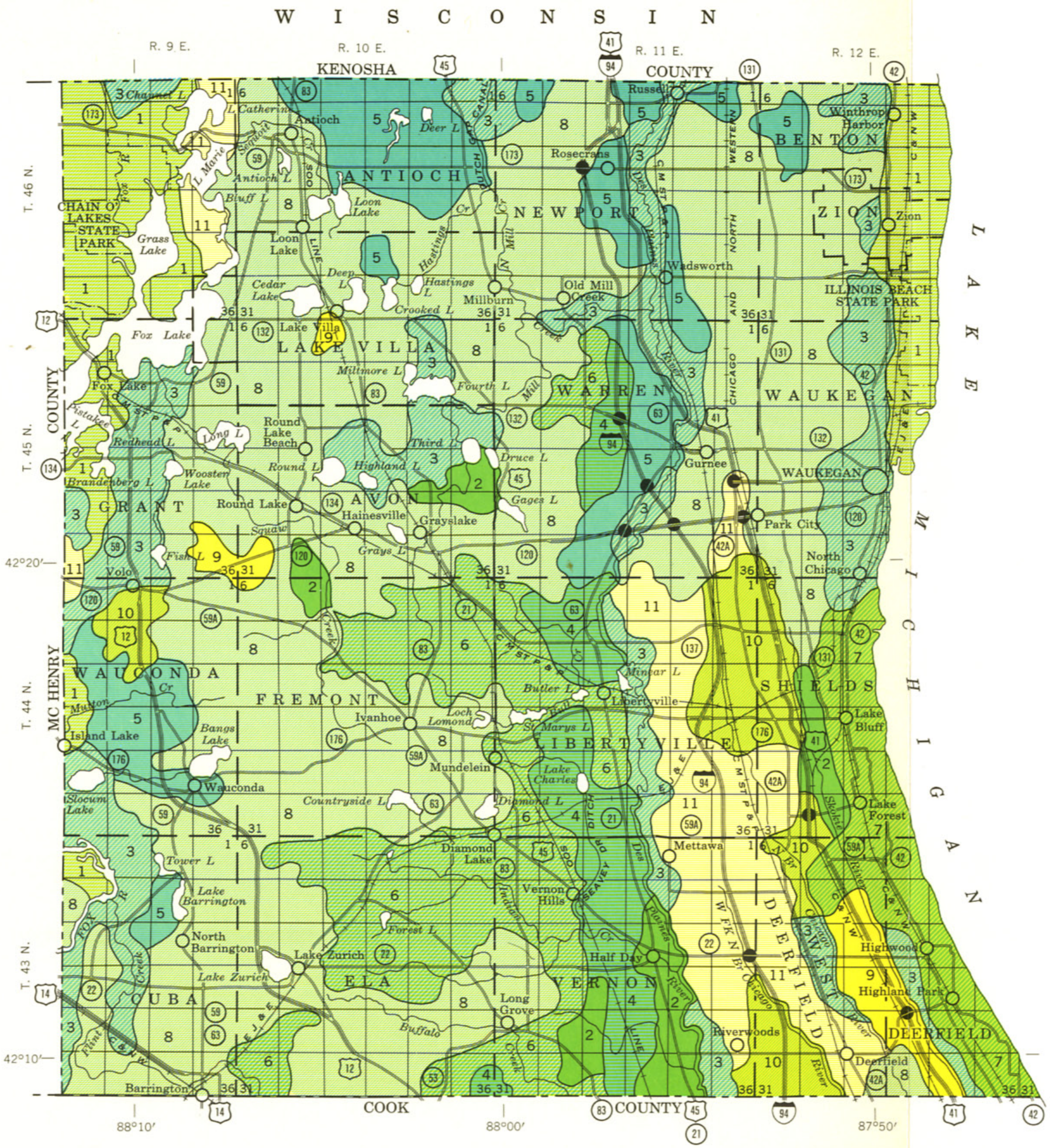
U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
ILLINOIS AGRICULTURAL EXPERIMENT STATION

GENERAL SOIL MAP
LAKE COUNTY, ILLINOIS

Scale 1:190 080



SOIL ASSOCIATIONS

1. Marsh-Fox-Boyer association: Wet, marshy areas and level to rolling, well drained to moderately well drained soils that are moderately deep over sand and gravel and have rapid to moderate permeability
2. Mundelein-Pella-Barrington association: Level to gently sloping, poorly drained to well-drained, deep soils that have moderate permeability
3. Zurich-Grays-Wauconda association: Nearly level to moderately steep, well-drained to somewhat poorly drained, deep soils that have moderate permeability
4. Corwin-Odell association: Level to gently sloping, well-drained to somewhat poorly drained, deep soils that have moderate permeability
5. Miami-Montmorenci association: Gently sloping to strongly sloping, well drained to moderately well drained, deep soils that have moderate permeability
6. Elliott-Markham association: Level to strongly sloping, well-drained to somewhat poorly drained, deep soils that have moderately slow permeability
7. Morley-Beecher-Hennepin association: Nearly level to very steep, well-drained to somewhat poorly drained, deep soils that have moderately slow to moderate permeability
8. Morley-Markham-Houghton association: Gently sloping to steep, well drained to moderately well drained, deep soils that have moderately slow permeability; and level to depressional, very dark colored, very poorly drained organic soils
9. Del Rey-Saylesville-Peotone association: Level to moderately sloping, somewhat poorly drained to well-drained, deep soils that have moderately slow permeability; and level to depressional, very dark colored, very poorly drained soils
10. Frankfort-Montgomery-Wauconda association: Level to gently sloping, somewhat poorly drained, deep soils that have slow to moderate permeability; and level to depressional, poorly drained to very poorly drained soils that have slow permeability
11. Nappanee-Montgomery association: Level to moderately sloping, somewhat poorly drained soils; and level to depressional, poorly drained to very poorly drained, deep soils that have slow permeability

August 1969

NOTE—

This map is intended for general planning. Each delineation may contain soils having ratings different from those shown on the map. Use detailed soil maps for operational planning.

INDEX TO MAP SHEETS

LAKE COUNTY, ILLINOIS

Scale 1:190 080

1 0 1 2 3 4 Miles

CONVENTIONAL SIGNS

WORKS AND STRUCTURES

Highways and roads
- Dual
- Good motor
- Poor motor
- Trail

Highway markers
- National Interstate
- U. S.
- State or county

Railroads
- Single track
- Multiple track
- Abandoned, single track
- Abandoned, multiple track

Bridges and crossings
- Road
- Trail
- Railroad
- Ferry (FY)
- Ford (FORD)
- Grade
- R. R. over
- R. R. under

Tunnel

Building
- School
- Church

Mine and quarry

Gravel pit

Power line

Cemetery

Dams

Levee

Tanks

Triangulation station

BOUNDARIES

- National or state
- County
- Reservation
- Land grant
- Small park, cemetery, airport
- Land survey division corners

DRAINAGE

Streams, double-line
- Perennial
- Intermittent

Streams, single-line
- Perennial
- Intermittent
  - Crossable with tillage implements
  - Not crossable with tillage implements
  - Unclassified

Canals and ditches (CANAL)

Lakes and ponds
- Perennial (water, w)
- Intermittent

Spring

Marsh or swamp

Wet spot

Alluvial fan

Drainage end

RELIEF

Escarpments
- Bedrock
- Other

SOIL SURVEY DATA

Soil boundary and symbol (194E2)

Gravel

Stoniness
- Stony
- Very stony

Rock outcrops

Chert fragments

Clay spot

Sand spot

Gumbo or scabby spot

Made land

Severely eroded spot

Blowout, wind erosion

Gully

SOIL LEGEND

A number shows the soil type or a group of undifferentiated soils. A capital letter, A, B, C, D, E, F, or G, shows the slope. W preceding the number shows a wet soil. Most symbols without a slope letter are those of nearly level soils. A final number, 2, after the slope letter indicates an eroded soil.

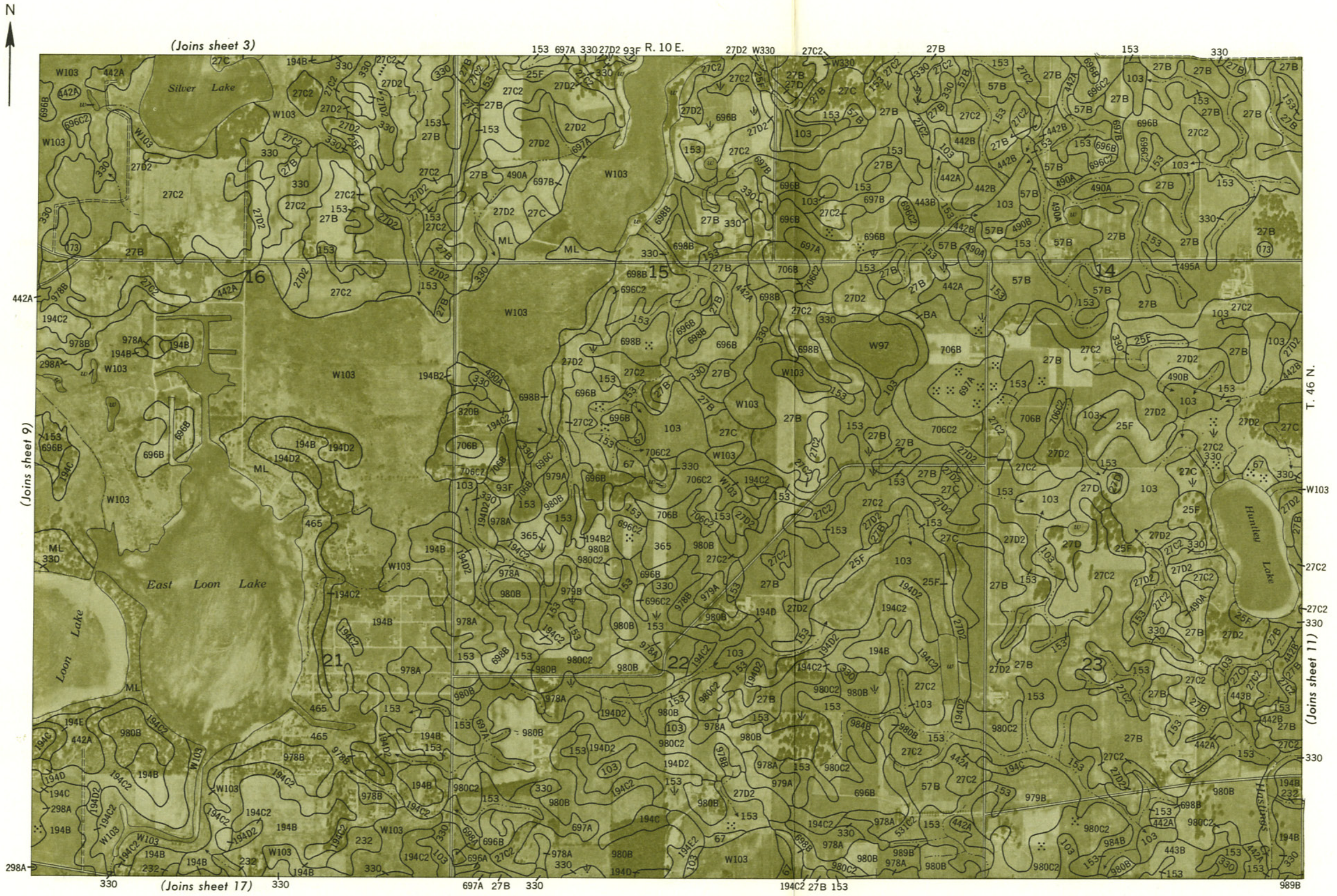
SYMBOL	NAME
25F	Hennepin loam, 15 to 30 percent slopes
25G	Hennepin loam, 30 to 60 percent slopes
27B	Miami silt loam, 2 to 4 percent slopes
27C	Miami silt loam, 4 to 7 percent slopes
27C2	Miami silt loam, 4 to 7 percent slopes, eroded
27D	Miami silt loam, 7 to 12 percent slopes
27D2	Miami silt loam, 7 to 12 percent slopes, eroded
V54	Plainfield sand, slightly acid variant, 1 to 4 percent slopes
57B	Montmorenci silt loam, 2 to 4 percent slopes
57C2	Montmorenci silt loam, 4 to 7 percent slopes, eroded
67	Harpster silty clay loam
93F	Rodman gravelly loam, 15 to 50 percent slopes
W97	Houghton peat, wet
103	Houghton muck
W103	Houghton muck, wet
107	Sawmill silty clay loam
146A	Elliott silt loam, 0 to 2 percent slopes
146B	Elliott silt loam, 2 to 4 percent slopes
153	Pella silty clay loam
189A	Martinton silt loam, 0 to 2 percent slopes
189B	Martinton silt loam, 2 to 4 percent slopes
192A	Del Rey silt loam, 0 to 2 percent slopes
192B	Del Rey silt loam, 2 to 4 percent slopes
194B	Morley silt loam, 2 to 4 percent slopes
194B2	Morley silt loam, 2 to 4 percent slopes, eroded
194C	Morley silt loam, 4 to 7 percent slopes
194C2	Morley silt loam, 4 to 7 percent slopes, eroded
194D	Morley silt loam, 7 to 12 percent slopes
194D2	Morley silt loam, 7 to 12 percent slopes, eroded
194E	Morley silt loam, 12 to 25 percent slopes
194E2	Morley silt loam, 12 to 25 percent slopes, eroded
232	Ashkum silty clay loam
228A	Nappanee silt loam, 0 to 2 percent slopes
228B	Nappanee silt loam, 2 to 4 percent slopes
228C2	Nappanee silt loam, 4 to 7 percent slopes, eroded
298A	Beecher silt loam, 0 to 2 percent slopes
298B	Beecher silt loam, 2 to 4 percent slopes
320A	Frankfort silt loam, 0 to 2 percent slopes
320B	Frankfort silt loam, 2 to 4 percent slopes
323C2	Casco loam, 3 to 10 percent slopes, eroded
325A	Dresden loam, 0 to 2 percent slopes
325B	Dresden loam, 2 to 4 percent slopes
327A	Fox loam, 0 to 2 percent slopes
327B	Fox loam, 2 to 4 percent slopes
327C2	Fox loam, 4 to 7 percent slopes, eroded
327D2	Fox loam, 7 to 12 percent slopes, eroded
330	Peotone silty clay loam
W330	Peotone silty clay loam, wet

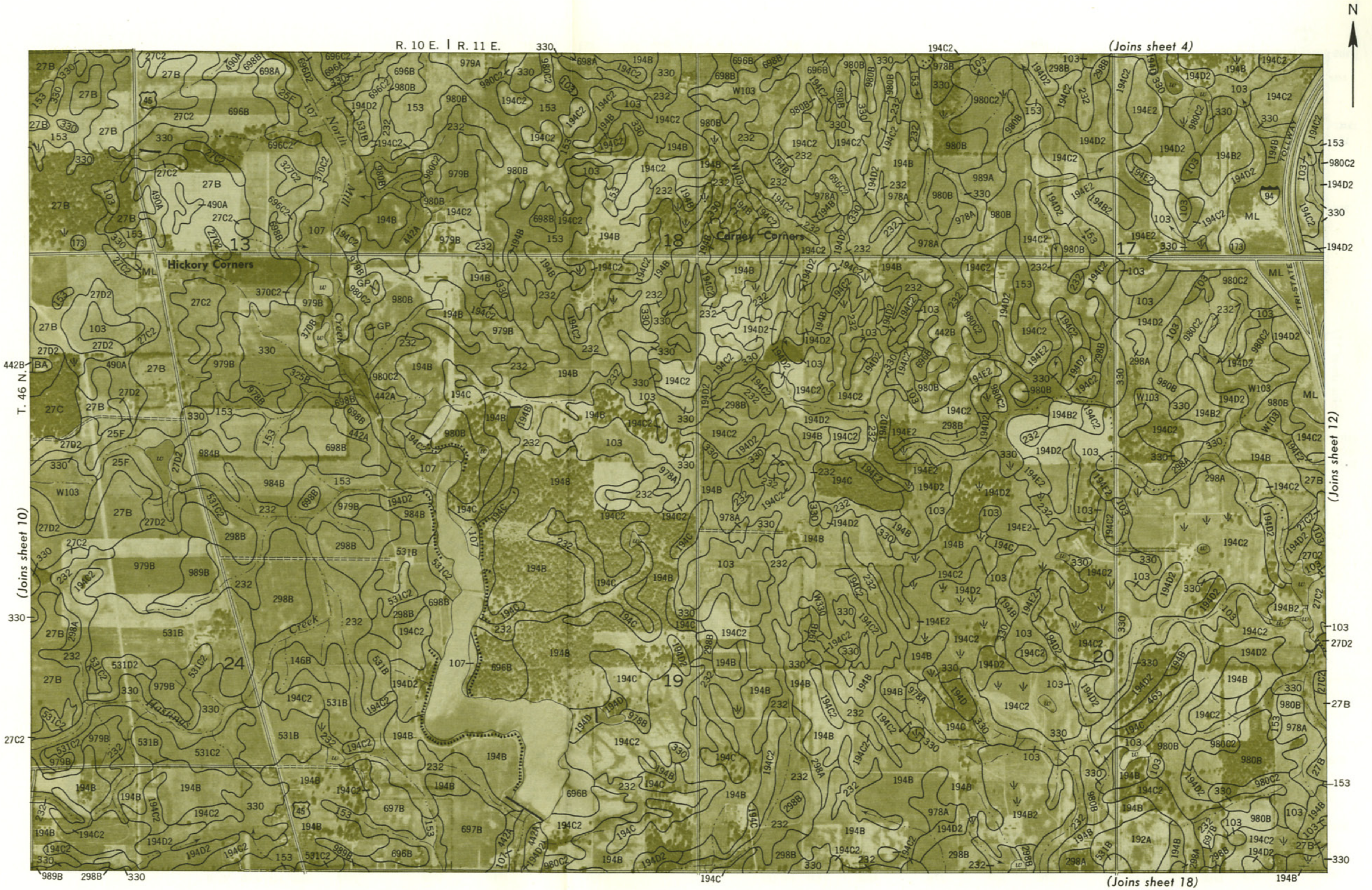
SYMBOL	NAME
365	Aptakisic silt loam
367	Beach sand
370B	Saylesville silt loam, 1 to 4 percent slopes
370C2	Saylesville silt loam, 4 to 7 percent slopes, eroded
442A	Mundelein silt loam, 0 to 2 percent slopes
442B	Mundelein silt loam, 2 to 4 percent slopes
443A	Barrington silt loam, 0 to 2 percent slopes
443B	Barrington silt loam, 2 to 4 percent slopes
465	Montgomery silty clay
490A	Odell silt loam, 0 to 2 percent slopes
490B	Odell silt loam, 2 to 4 percent slopes
495A	Corwin silt loam, 0 to 2 percent slopes
495B	Corwin silt loam, 2 to 4 percent slopes
513	Granby loamy fine sand
531B	Markham silt loam, 1 to 4 percent slopes
531B2	Markham silt loam, 2 to 4 percent slopes, eroded
531C	Markham silt loam, 4 to 7 percent slopes
531C2	Markham silt loam, 4 to 7 percent slopes, eroded
531D2	Markham silt loam, 7 to 12 percent slopes, eroded
696A	Zurich silt loam, 0 to 2 percent slopes
696B	Zurich silt loam, 2 to 4 percent slopes
696C	Zurich silt loam, 4 to 7 percent slopes
696C2	Zurich silt loam, 4 to 7 percent slopes, eroded
696D2	Zurich silt loam, 7 to 15 percent slopes, eroded
697A	Wauconda silt loam, 0 to 2 percent slopes
697B	Wauconda silt loam, 2 to 4 percent slopes
698A	Grays silt loam, 0 to 2 percent slopes
698B	Grays silt loam, 2 to 4 percent slopes
706B	Boyer sandy loam, 1 to 4 percent slopes
706C2	Boyer sandy loam, 4 to 10 percent slopes, eroded
978A	Wauconda and Beecher silt loams, 0 to 2 percent slopes
978B	Wauconda and Beecher silt loams, 2 to 4 percent slopes
979A	Grays and Markham silt loams, 0 to 2 percent slopes
979B	Grays and Markham silt loams, 2 to 4 percent slopes
980B	Zurich and Morley silt loams, 2 to 4 percent slopes
980C2	Zurich and Morley silt loams, 4 to 7 percent slopes, eroded
981A	Wauconda and Frankfort silt loams, 0 to 2 percent slopes
981B	Wauconda and Frankfort silt loams, 2 to 4 percent slopes
982A	Aptakisic and Nappanee silt loams, 0 to 2 percent slopes
982B	Aptakisic and Nappanee silt loams, 2 to 4 percent slopes
983B	Zurich and Nappanee silt loams, 2 to 4 percent slopes
984B	Barrington and Varna silt loams, 2 to 4 percent slopes
989A	Mundelein and Elliott silt loams, 0 to 2 percent slopes
989B	Mundelein and Elliott silt loams, 2 to 4 percent slopes
BA	Borrow area
GP	Gravel pits
MA	Marsh
ML	Made land

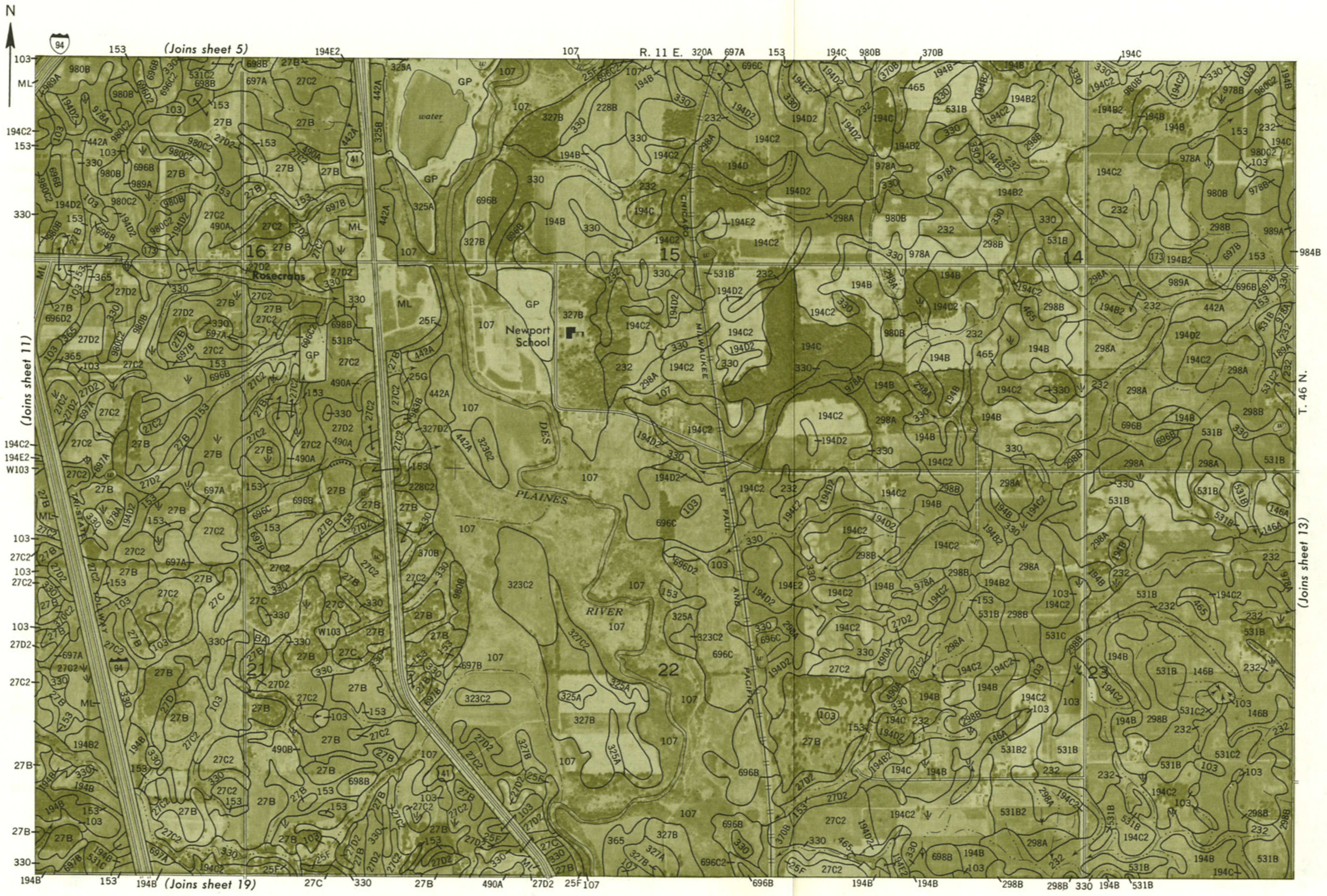
Soil map constructed 1968 by Cartographic Division, Soil Conservation Service, USDA, from 1961 aerial photographs. Controlled mosaic based on Illinois plane coordinate system, east zone, transverse Mercator projection, 1927 North American datum.

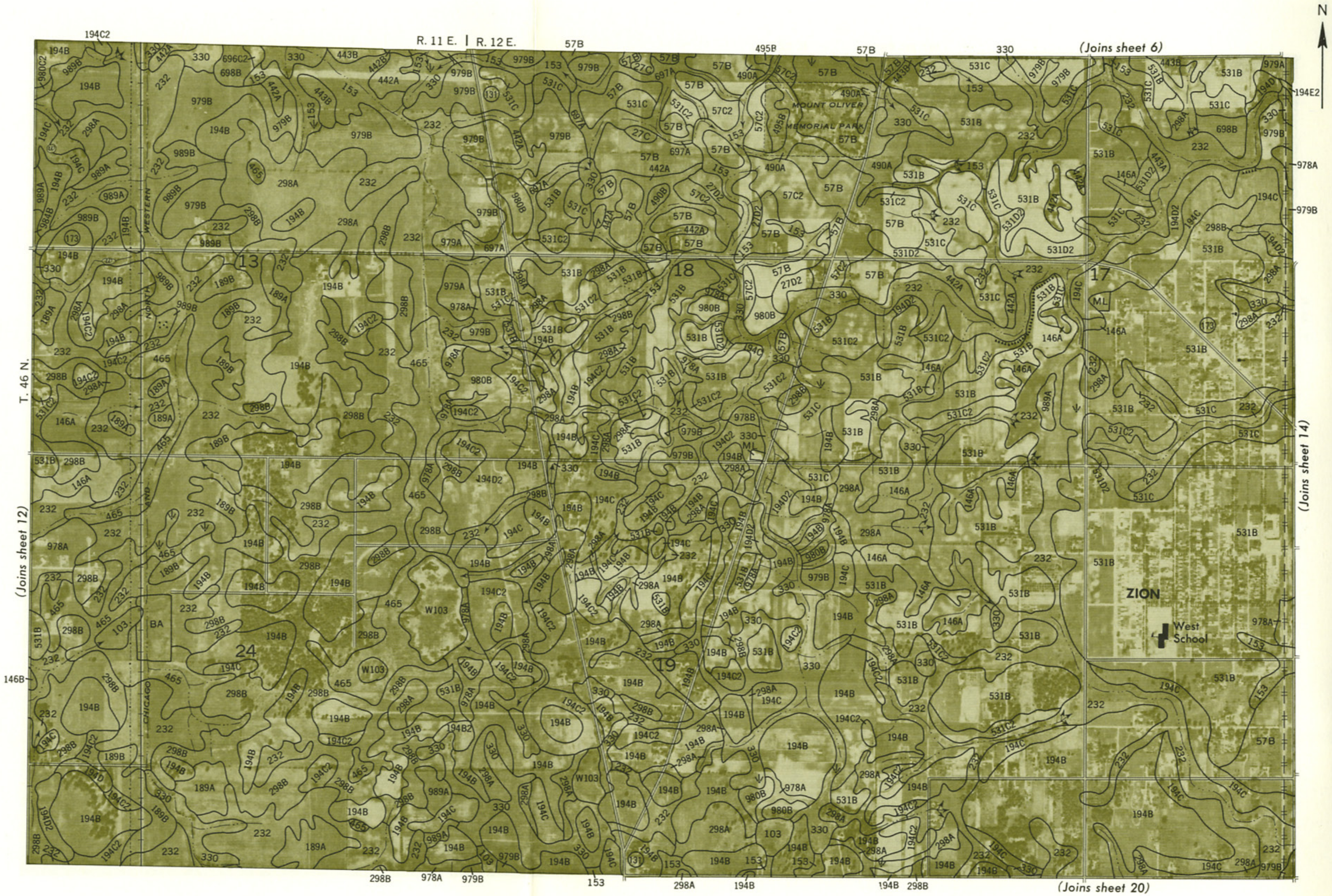

N
KENOSHA COUNTY WISCONSIN
R. 9 E.
MC HENRY COUNTY
T. 46 N.
FOX RIVER
PARK BDY
CHAIN O'LAKES STATE PARK
Lake
Channel
(Joins sheet 2)
(Joins sheet 8)

LAKE COUNTY, ILLINOIS — SHEET NUMBER 10

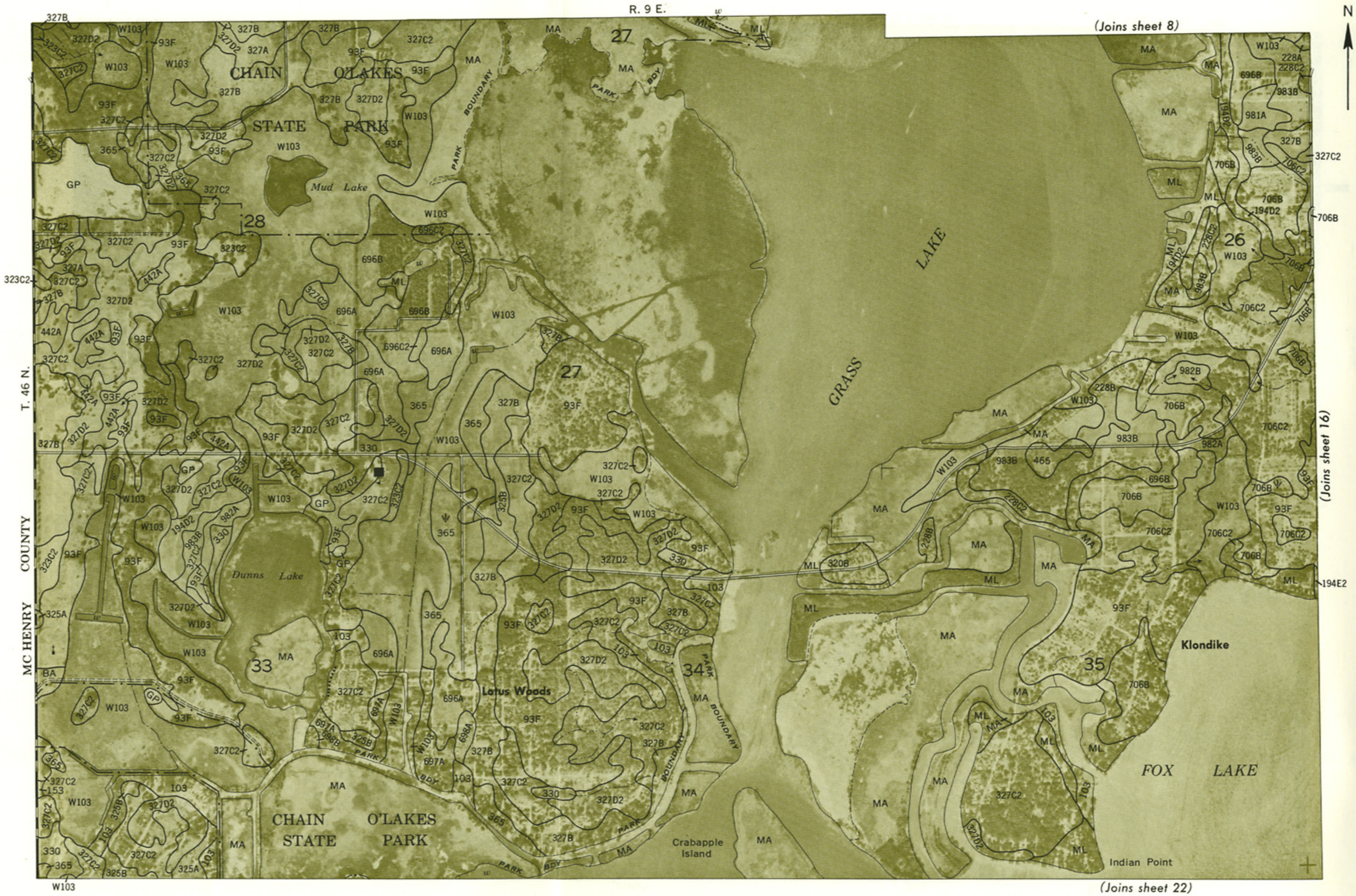



N
R. 10 E.
R. 11 E.
(Joins sheet 4)
(Joins sheet 10)
(Joins sheet 12)
(Joins sheet 18)
T. 46 N.
Hickory Corners
Carney Corners
North
Mill
Creek
Creek
Hastings
TOLLWAY
TRI-STATE
13
18
17
24
19
20


N
(Joins sheet 5)
R. 11 E.
(Joins sheet 11)
(Joins sheet 13)
T. 46 N.
(Joins sheet 19)
water
Rosecrans
Newport School
DES PLAINES RIVER
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
TRI-STATE TOLLWAY
16
15
14
21
22
23


N
(Joins sheet 6)
(Joins sheet 12)
(Joins sheet 14)
(Joins sheet 20)
R. 11 E.
R. 12 E.
T. 46 N.
MOUNT OLIVER MEMORIAL PARK
ZION
West School
CHICAGO AND NORTH WESTERN
13
18
17
24
19

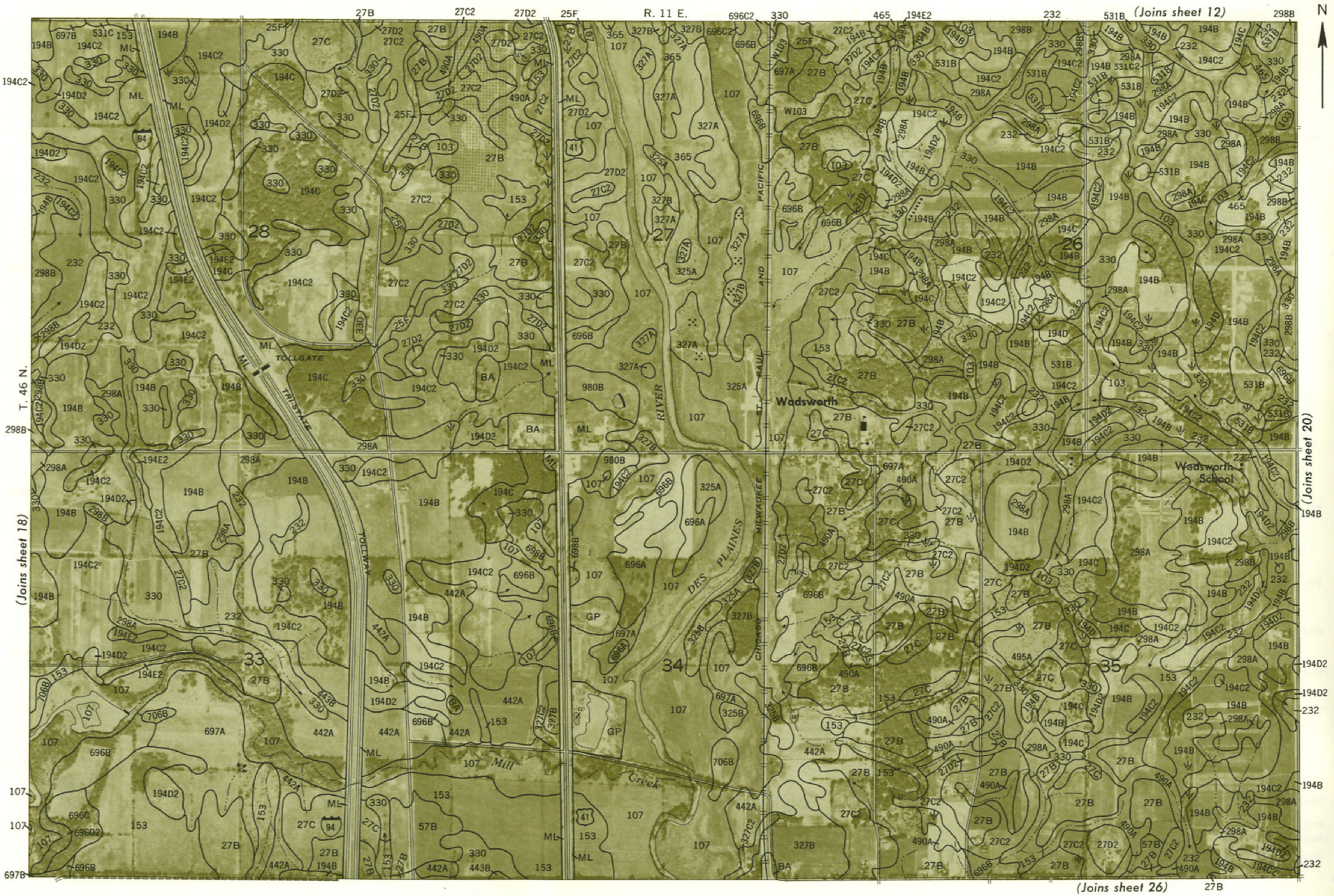

N
(Joins sheet 7)
R. 12 E.
T. 46 N.
(Joins sheet 13)
(Joins sheet 21)
LAKE MICHIGAN
ZION
CAMP LOGAN
CHICAGO AND NORTH WESTERN
INDUSTRIAL SITE
WARWICK CITY DUMP
15
14
16
21
22
23

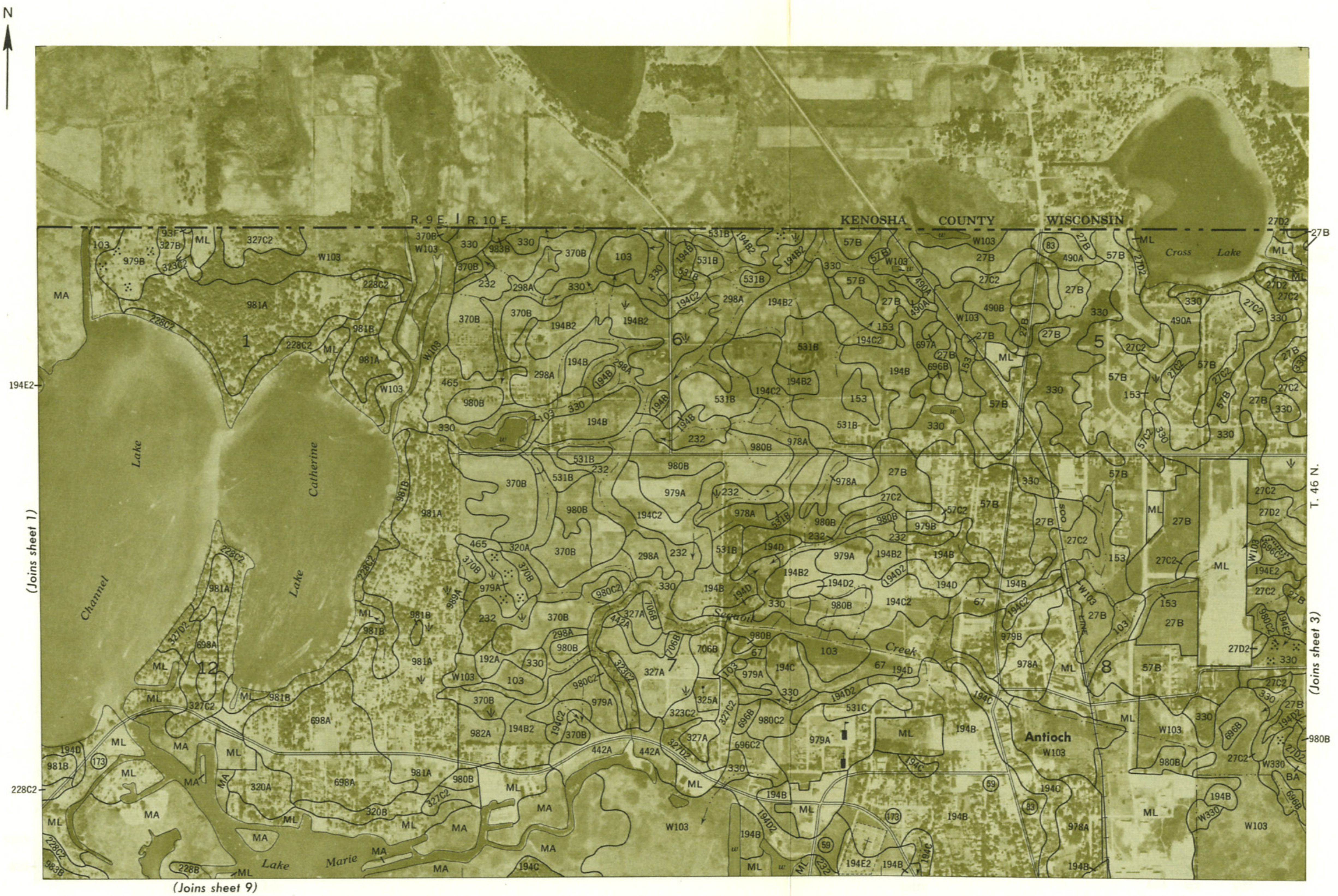

R. 9 E.
N
(Joins sheet 8)
(Joins sheet 16)
(Joins sheet 22)
T. 46 N.
MC HENRY COUNTY
CHAIN O'LAKES STATE PARK
Mud Lake
Dunns Lake
GRASS LAKE
FOX LAKE
Lotus Woods
Klondike
Crabapple Island
Indian Point
PARK BOUNDARY
27
28
26
33
34
35

LAKE COUNTY, ILLINOIS — SHEET NUMBER 16


R. 10 E.
(Joins sheet 10)
N
T. 46 N.
(Joins sheet 16)
(Joins sheet 18)
(Joins sheet 24)
Oakland School
Sun Lake
Deep Lake
Crooked Lake
Hastings Lake
Hastings Creek
Cedar Lake
Lake Villa
Lindenhurst
water
28
27
26
33
34
35


N
(Joins sheet 11)
R. 10 E. | R. 11 E.
(Joins sheet 17)
(Joins sheet 19)
(Joins sheet 25)
T. 46 N.
Millburn
Old Mill Creek
North Mill Creek
Mill Creek
25
29
30
31
32
36
45
water


N
R. 11 E.
T. 46 N.
(Joins sheet 12)
(Joins sheet 18)
(Joins sheet 20)
(Joins sheet 26)
TOLLGATE
TRISTATE
TOLLWAY
DES PLAINES
RIVER
Mill
Creek
CHICAGO
MILWAUKEE
ST. PAUL
AND
PACIFIC
Wadsworth
Wadsworth School
28
27
26
33
34
35
94
41


N
R. 9 E.
R. 10 E.
KENOSHA COUNTY WISCONSIN
Cross Lake
Channel Lake
Lake Catherine
Lake Marie
Sequoit Creek
Antioch
T. 46 N.
(Joins sheet 1)
(Joins sheet 3)
(Joins sheet 9)


N
(Joins sheet 13)
R. 11 E. | R. 12 E.
(Joins sheet 19)
(Joins sheet 21)
(Joins sheet 27)
T. 46 N.
25
30
29
36
31
32
Howe School
BENTON GREENWOOD CEMETERY
CHICAGO AND NORTH WESTERN
Oak Crest School
Beach Park School
Beach Station
WAUKEGAN MEMORIAL AIRPORT
Townline School

(Joins sheet 14)

R. 12 E.

T. 46 N.

(Joins sheet 20)

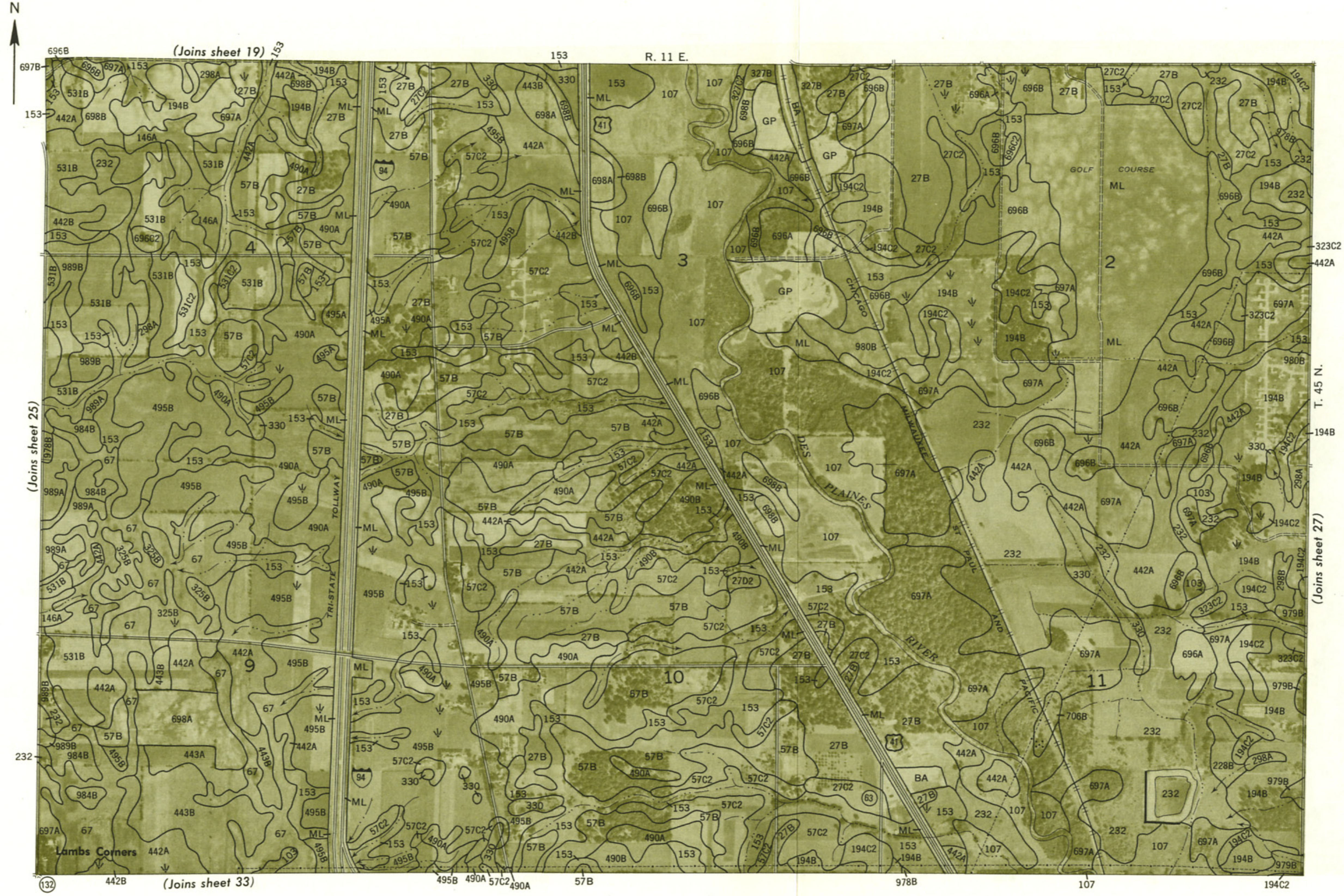
(Joins sheet 28)

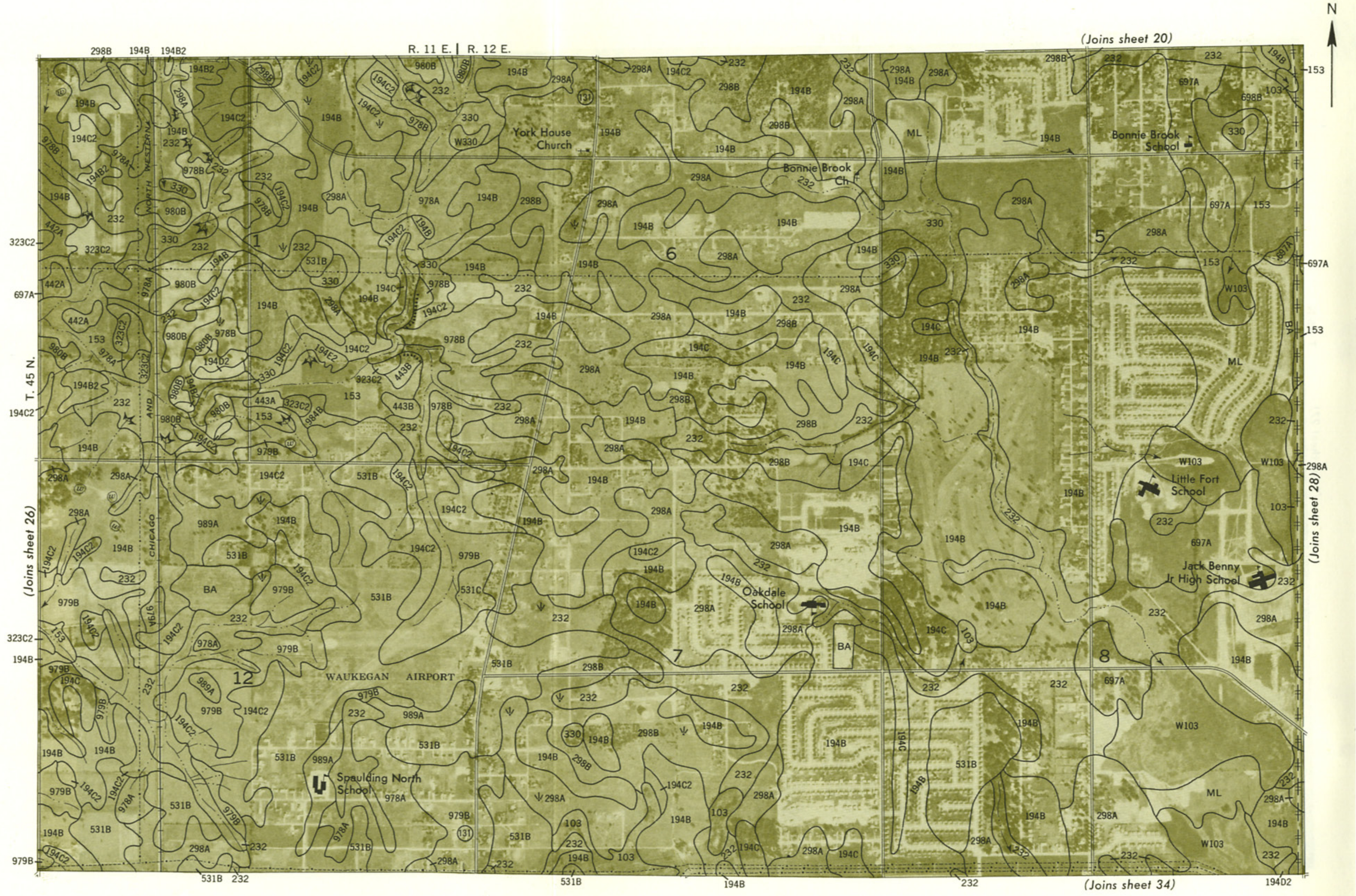

N
(Joins sheet 15)
R. 9 E.
(Joins sheet 23)
(Joins sheet 29)
T. 45 N.
MC HENRY COUNTY
NIPPERSINK LAKE
FOX LAKE
PISTAKEE LAKE
NIPPERSINK CREEK
SQUAW CREEK
STATE PARK
Point Comfort
Riverside Island
Crabapple Island
Stanton Point
Lippincott Point
Ingleside Shore
Fox Lake
Eagle Point
CHICAGO MILWAUKEE ST PAUL AND PACIFIC


N
R. 9 E.
R. 10 E.
T. 45 N.
(Joins sheet 16)
(Joins sheet 24)
(Joins sheet 30)
(Joins sheet 22)
FOX
LAKE
Lakeland Church
Sewage Disposal
Fox Lake Hills
Monaville
Fox Lake Cemetery
St Bede School
Creek
Eagle
ML


N
(Joins sheet 17)
R. 10 E.
T. 45 N.
(Joins sheet 23)
(Joins sheet 25)
(Joins sheet 31)
Prince of Peace School
ANGOLIAN CEMETERY
Eagle Cr
SOO LINE
Sand Lake
Slough Lake
Miltmore Lake
Fourth Lake
Venetian Village
4
3
2
9
10
11
11


N
R. 10 E.
R. 11 E.
(Joins sheet 18)
(Joins sheet 24)
(Joins sheet 26)
(Joins sheet 32)
T. 45 N.
Hooper School
Mill Creek
Fourth Lake
Wedges Corner
Lambs Corners
1
5
6
7
8
12


N
(Joins sheet 19)
R. 11 E.
(Joins sheet 25)
(Joins sheet 27)
T. 45 N.
(Joins sheet 33)
TRI-STATE TOLLWAY
DES PLAINES RIVER
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
GOLF COURSE
Lambs Corners
4
3
2
9
10
11


N
(Joins sheet 20)
R. 11 E. | R. 12 E.
T. 45 N.
(Joins sheet 26)
(Joins sheet 28)
(Joins sheet 34)
York House Church
Bonnie Brook Ch
Bonnie Brook School
CHICAGO AND NORTH WESTERN
Little Fort School
Jack Benny Jr High School
Oakdale School
WAUKEGAN AIRPORT
Spaulding North School
1
5
6
7
8
12
131

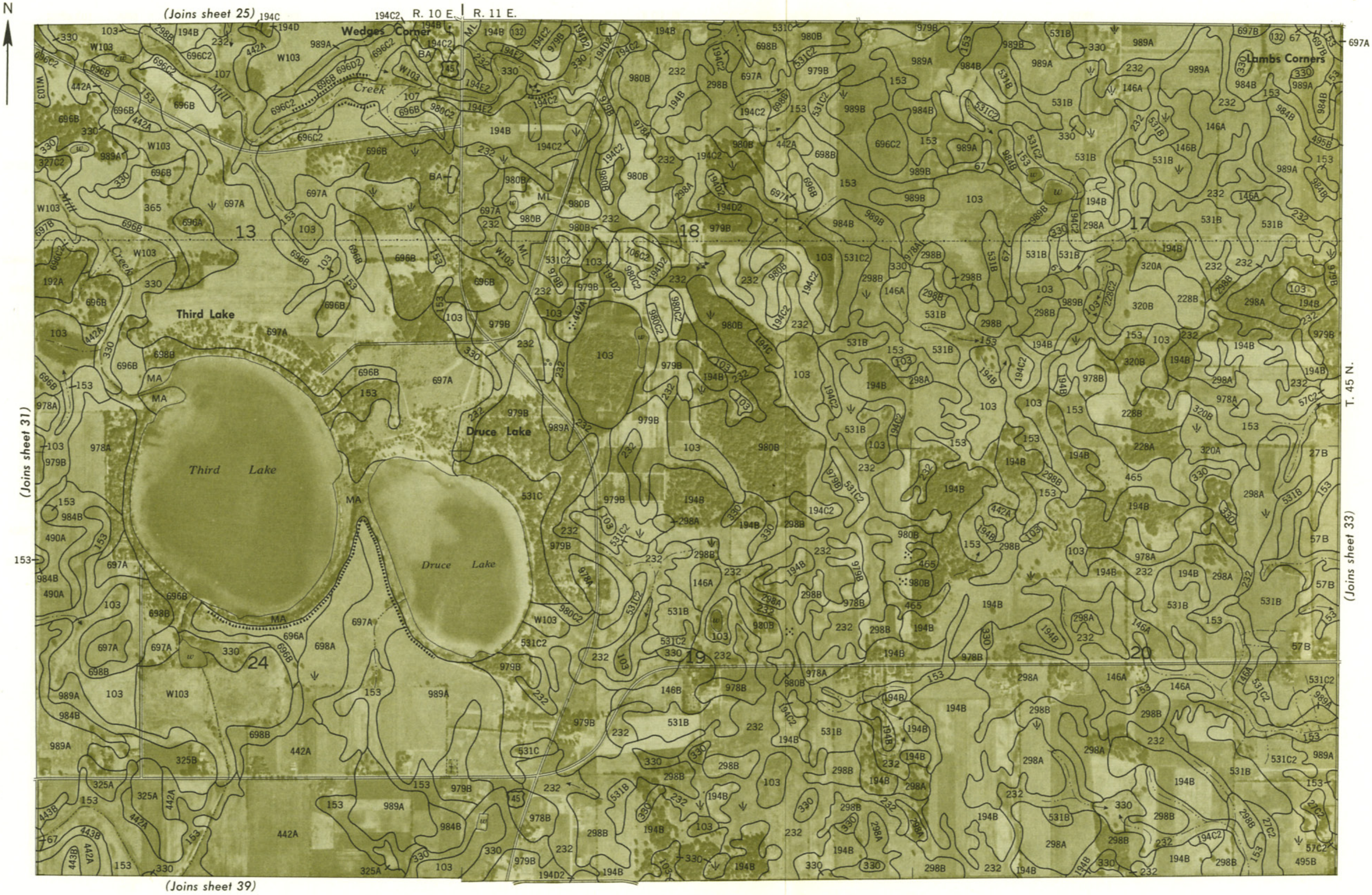

N
(Joins sheet 21)
R. 12 E.
T. 45 N.
(Joins sheet 27)
(Joins sheet 33)
ILLINOIS BEACH STATE PARK
Dead Lake
Dead River
LAKE MICHIGAN
WAUKEGAN
INDUSTRIAL SITE
CHICAGO AND NORTH WESTERN
E J & E
water
4
3
2
9
10
11
42
153
697A
698A
698B
696B
696C
706B
330
327C2
327D2
513
V54
MA
367
25G
25F
365
298A
232
103
194B
BA
ML

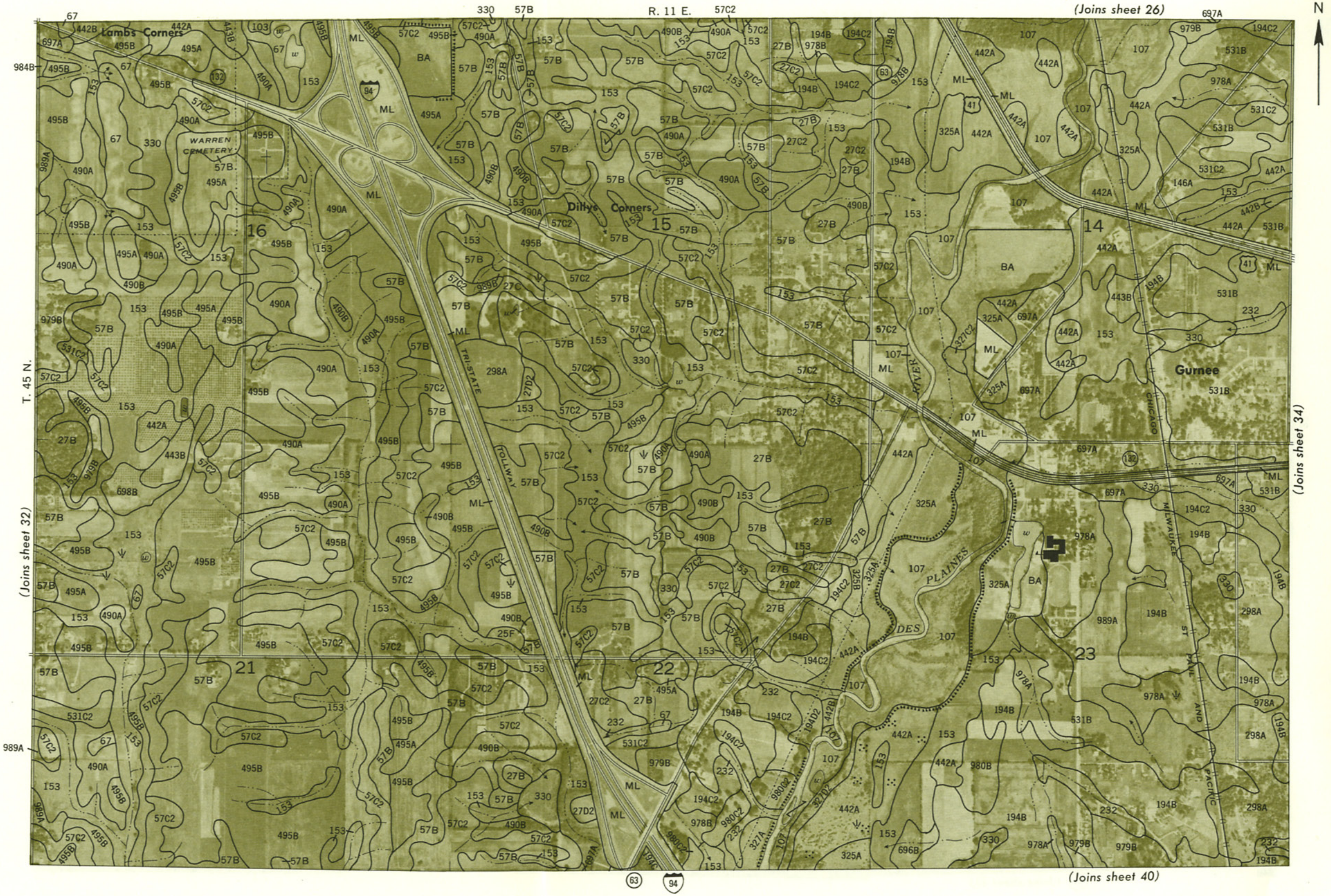

R. 9 E.
(Joins sheet 22)
N
T. 45 N.
MC HENRY COUNTY
(Joins sheet 30)
(Joins sheet 36)
Kings Island
Cedar Island
PISTAKEE LAKE
Redhead Lake
Brandenberg Lake
Duck Lake
Wooster Lake
SQUAW CREEK
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
Big Hollow School
16
15
14
21
22
23

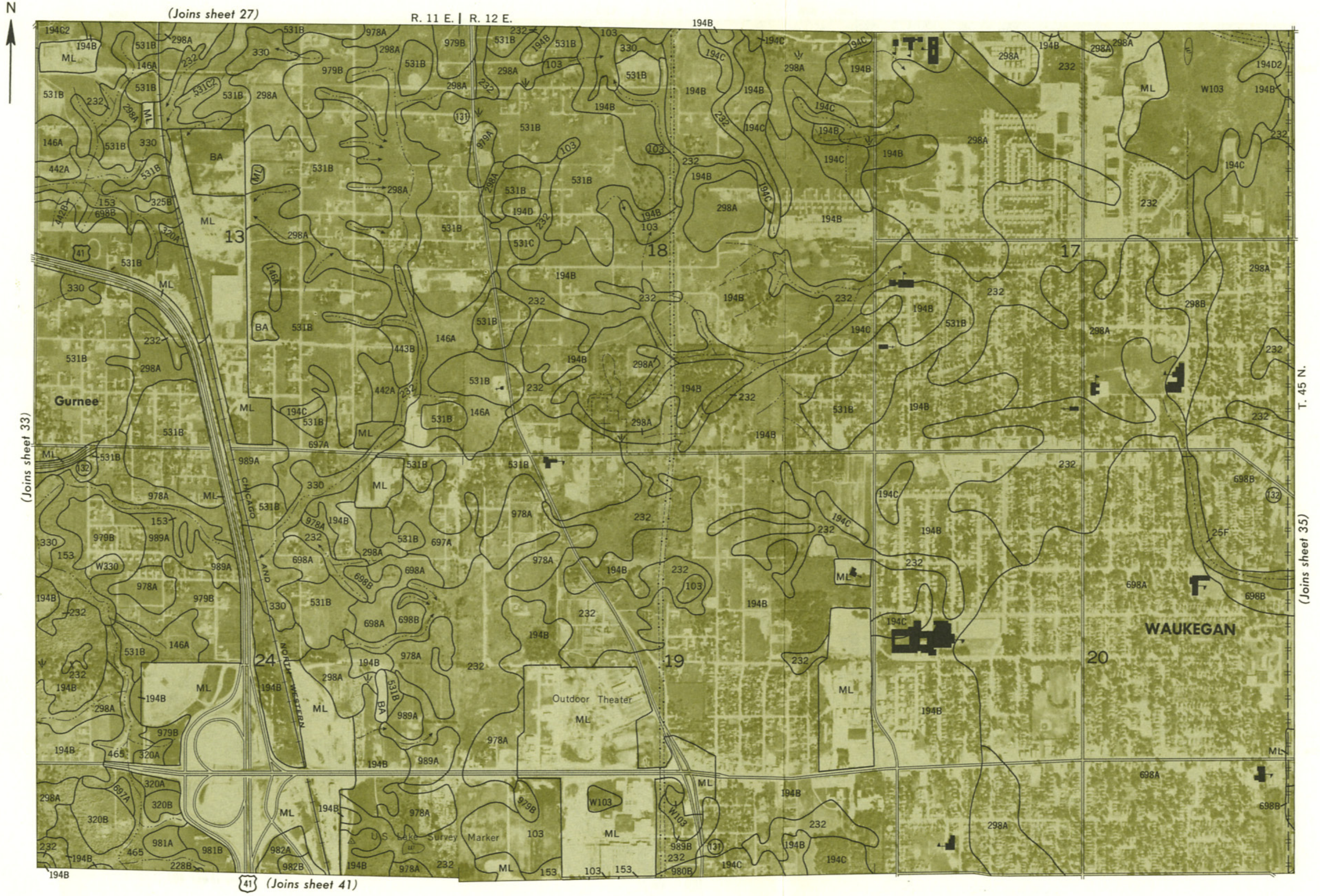

N
KENOSHA COUNTY
WISCONSIN
R. 10 E.
T. 46 N.
Benet Lake
water
Deer Lake
Silver Lake
(Joins sheet 2)
(Joins sheet 4)
(Joins sheet 10)


N
(Joins sheet 23)
R. 9 E. | R. 10 E.
(Joins sheet 29)
(Joins sheet 31)
(Joins sheet 37)
T. 45 N.
Ingleside
Round Lake Heights
Round Lake Beach
Eagle Creek
LONG LAKE
O'Boyle Point
Pickerel Point
Long Lake
Ellis School
SEWAGE DISPOSAL
High School
SQUAW CR
Round Lake
water
13
17
18
19
20
24


R. 10 E.
(Joins sheet 24)
N
T. 45 N.
(Joins sheet 30)
(Joins sheet 32)
(Joins sheet 38)
Round Lake Beach
Round Lake Park
Avon Center School
AVON CENTRE CEMETERY
Round Lake
Highland Lake
Mill Creek
SOO LINE
16
15
14
21
22
23


N
(Joins sheet 25)
R. 10 E.
R. 11 E.
Wedges Corner
Lambs Corners
Mill Creek
Mill Creek
Third Lake
Third Lake
Druce Lake
Druce Lake
13
18
17
24
19
20
T. 45 N.
(Joins sheet 31)
(Joins sheet 33)
(Joins sheet 39)


R. 11 E.
T. 45 N.
N
(Joins sheet 26)
(Joins sheet 34)
(Joins sheet 40)
(Joins sheet 32)
Lambs Corners
WARREN CEMETERY
Dillys Corners
Gurnee
TRI-STATE TOLLWAY
DES PLAINES RIVER
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
14
15
16
21
22
23
94
41
63
132


N
(Joins sheet 27)
R. 11 E. | R. 12 E.
(Joins sheet 33)
(Joins sheet 35)
T. 45 N.
(Joins sheet 41)
Gurnee
WAUKEGAN
Outdoor Theater
CHICAGO AND NORTH WESTERN
U.S. Lake Survey Marker


(Joins sheet 28)
R. 12 E.
N
T. 45 N.
(Joins sheet 34)
(Joins sheet 42)
WAUKEGAN
LAKE MICHIGAN
CHICAGO AND NORTH WESTERN
ELGIN JOLIET AND EASTERN
Waukegan River
14
15
16
21
22
298A
698B
194B
698A
232
25G
25F
513
MA
ML
367
42
132

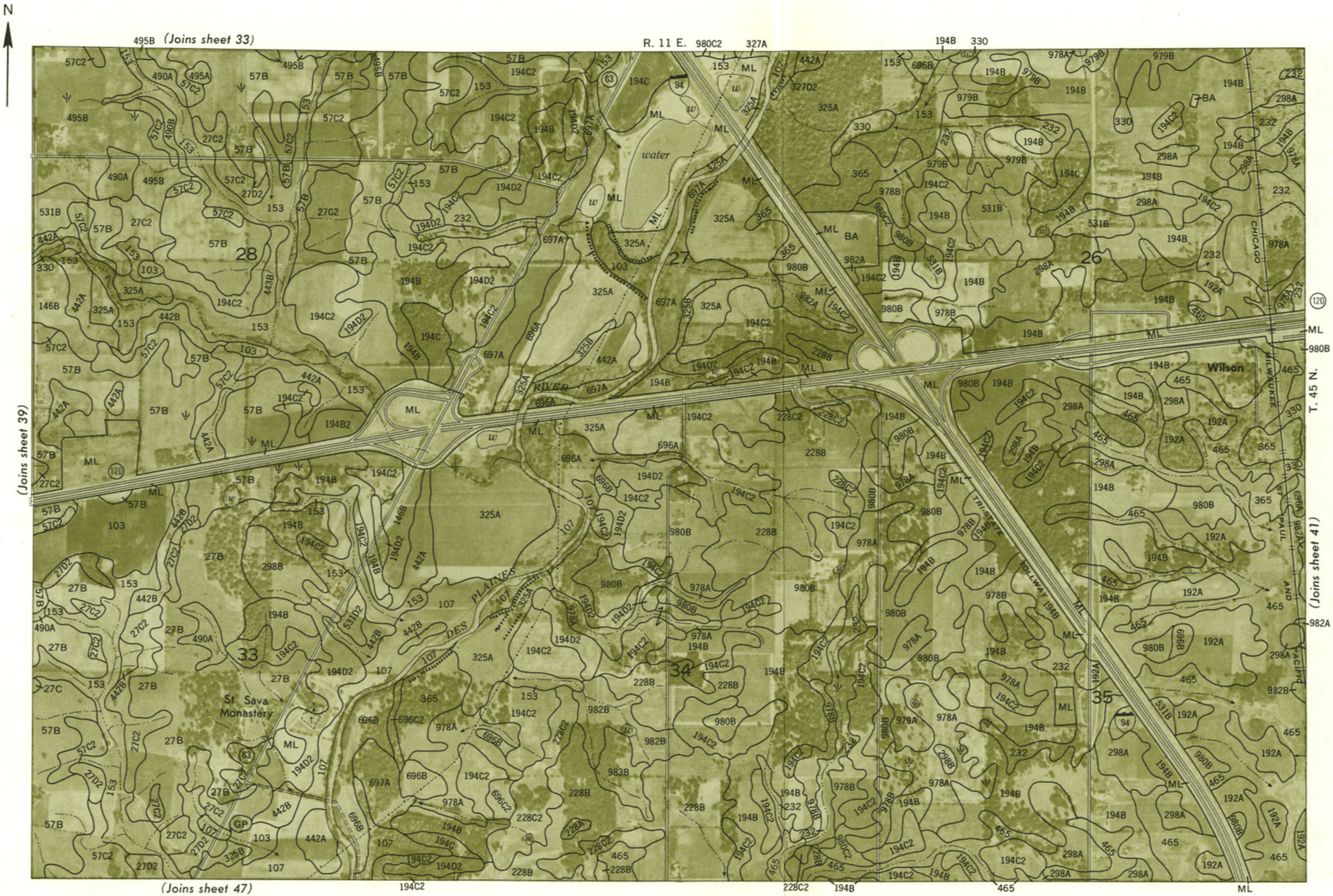
LAKE COUNTY, ILLINOIS — SHEET NUMBER 36

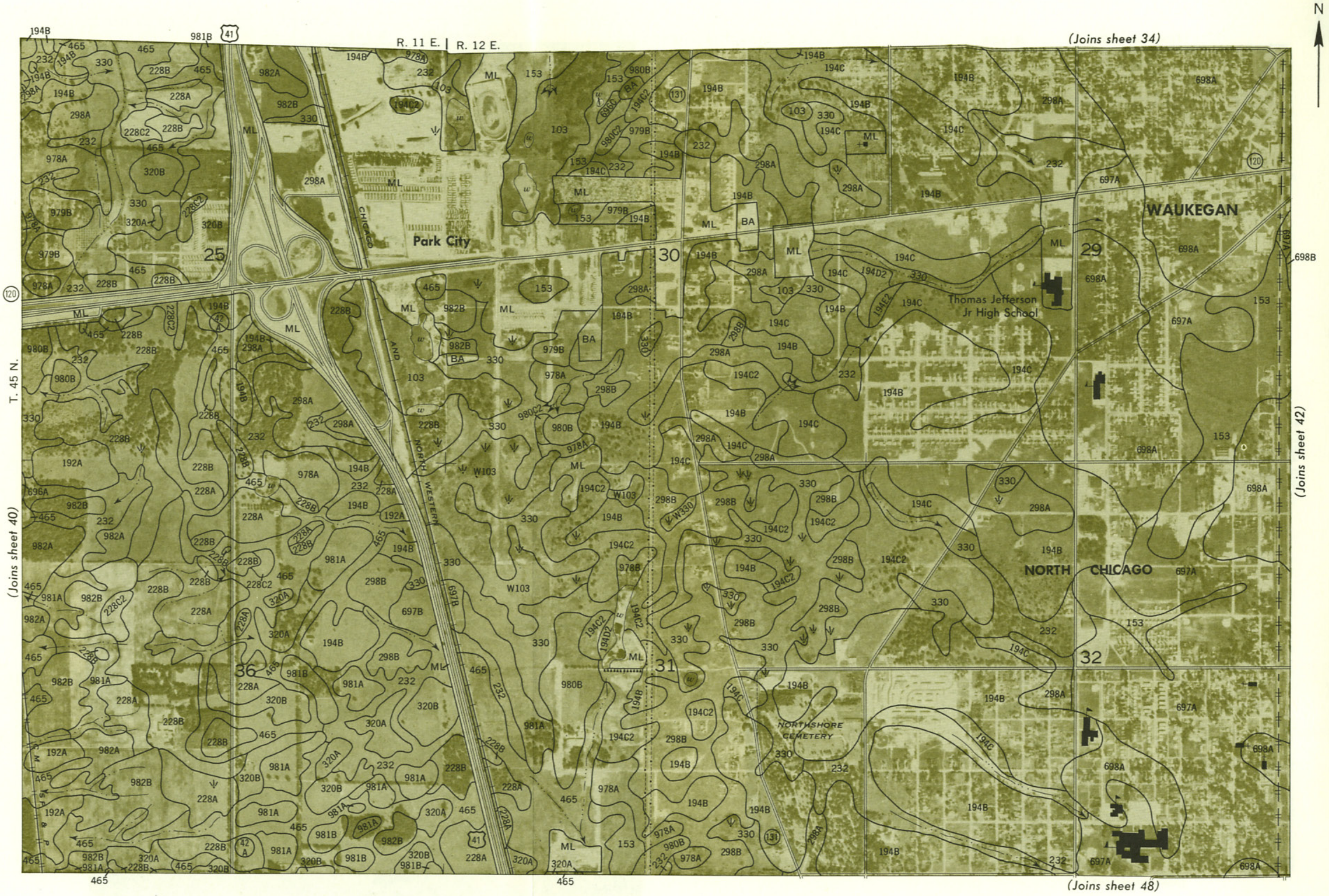

R. 9 E. | R. 10 E.
(Joins sheet 30)
N
(Joins sheet 36)
(Joins sheet 38)
(Joins sheet 44)
T. 45 N.
Round Lake
Park School
St Joseph School
Squaw
Creek
FORT HILL CEMETERY
C M St P & P
25
30
29
36
31
32


N
(Joins sheet 31)
R. 10 E.
T. 45 N.
(Joins sheet 37)
(Joins sheet 39)
(Joins sheet 45)
Round Lake Park
Cranberry Lake
Hainesville
Grayslake
Grays Lake
Squaw Creek
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
SOO LINE
28
27
26
33
34
35
134
120
83
21

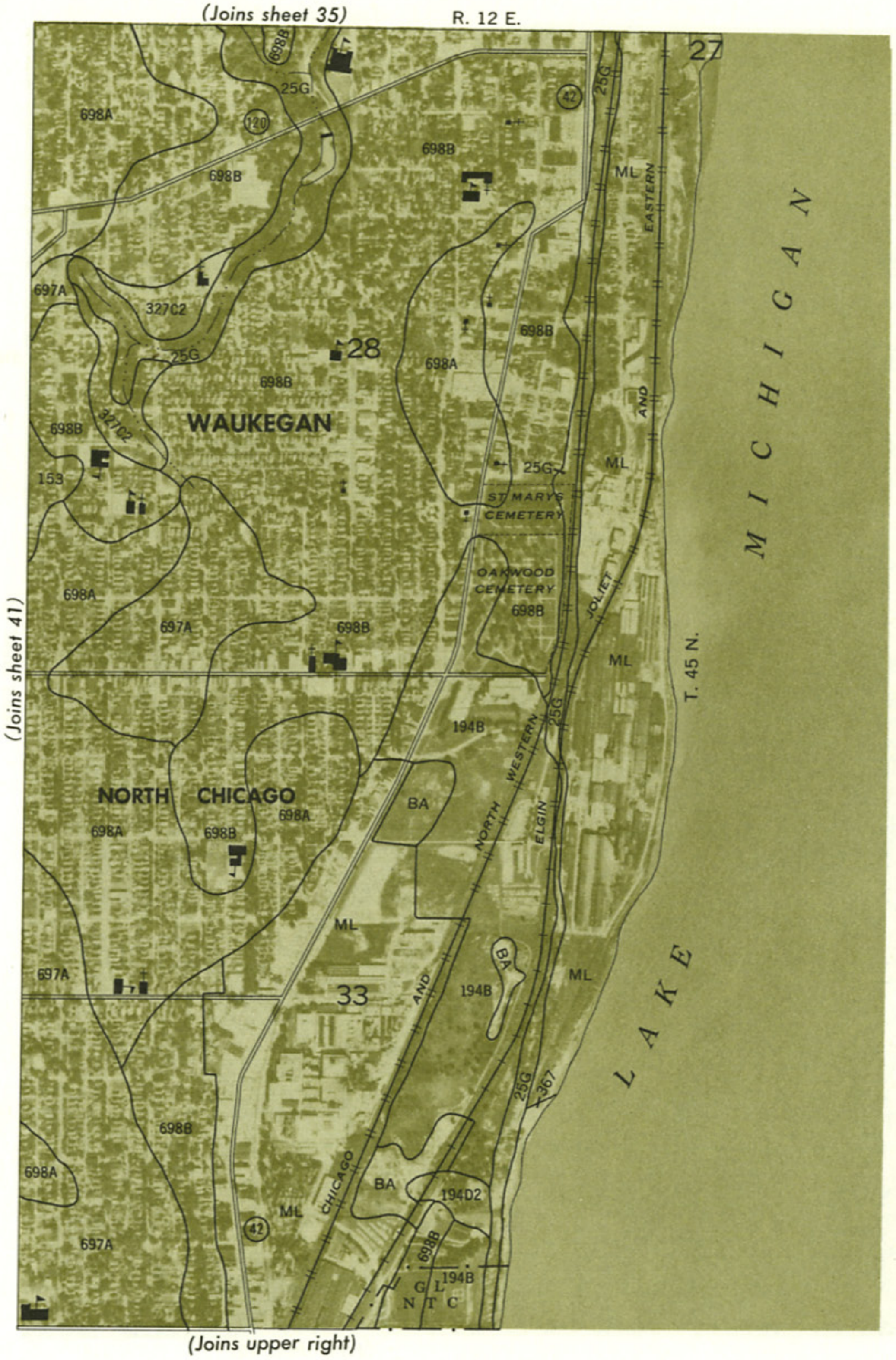

N
R. 10 E.
R. 11 E.
(Joins sheet 32)
(Joins sheet 40)
(Joins sheet 46)
(Joins sheet 38)
T. 45 N.
Idlewild
Gages Lake
Valley Lake
Twin Lakes
Wildwood
Woodland School
Woodland Jr High School
25
30
29
36
31
32

LAKE COUNTY, ILLINOIS — SHEET NUMBER 4


N
(Joins sheet 33)
R. 11 E.
(Joins sheet 39)
(Joins sheet 41)
(Joins sheet 47)
T. 45 N.
28
27
26
33
34
35
water
DES PLAINES RIVER
Wilson
St Sava Monastery
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
TRI-STATE TOLLWAY
94
120
63

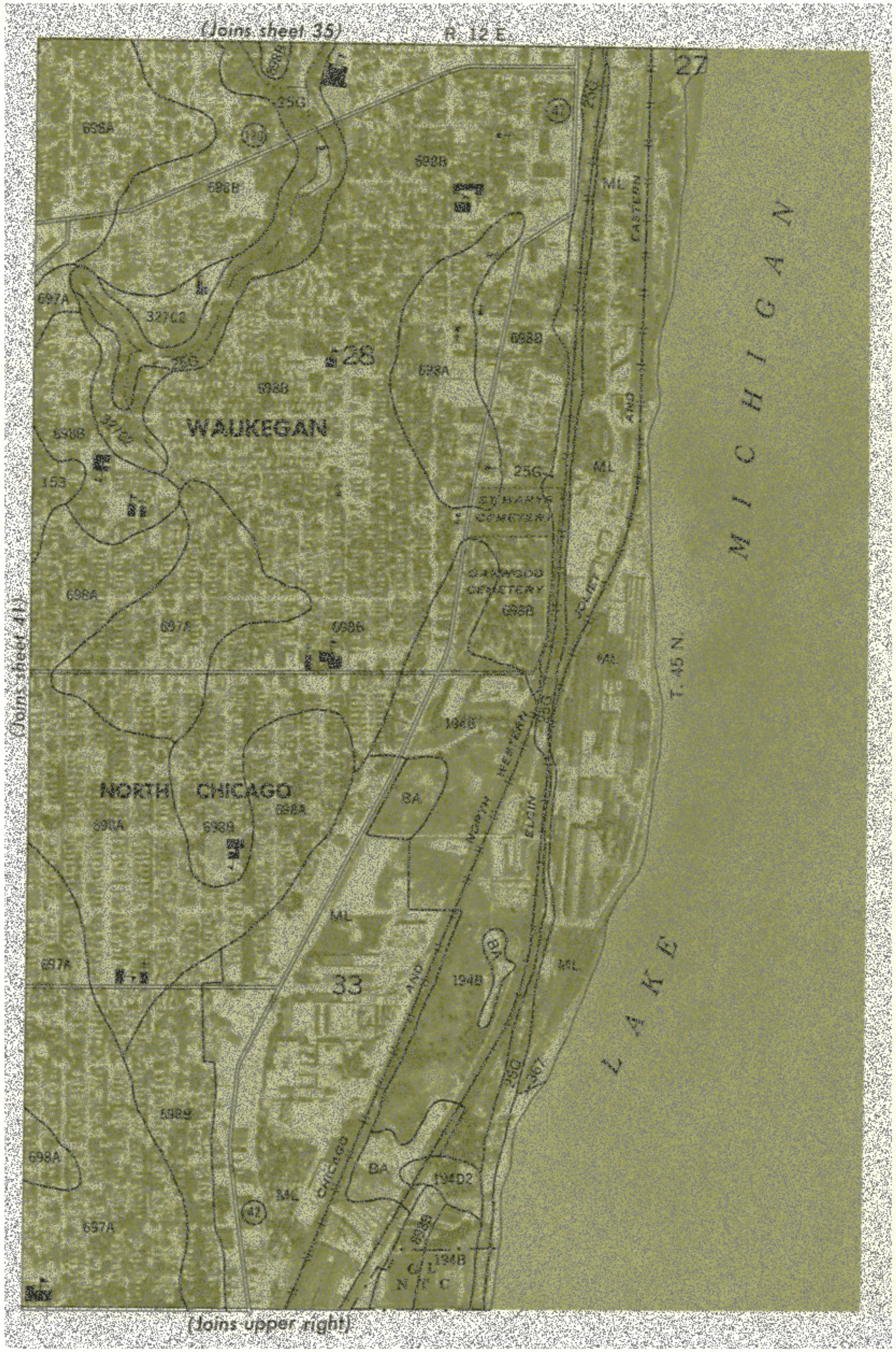

N
R. 11 E.
R. 12 E.
(Joins sheet 34)
(Joins sheet 40)
(Joins sheet 42)
(Joins sheet 48)
T. 45 N.
Park City
WAUKEGAN
NORTH CHICAGO
Thomas Jefferson
Jr High School
NORTHSHORE
CEMETERY
CHICAGO AND NORTH WESTERN
25
30
29
36
31
32

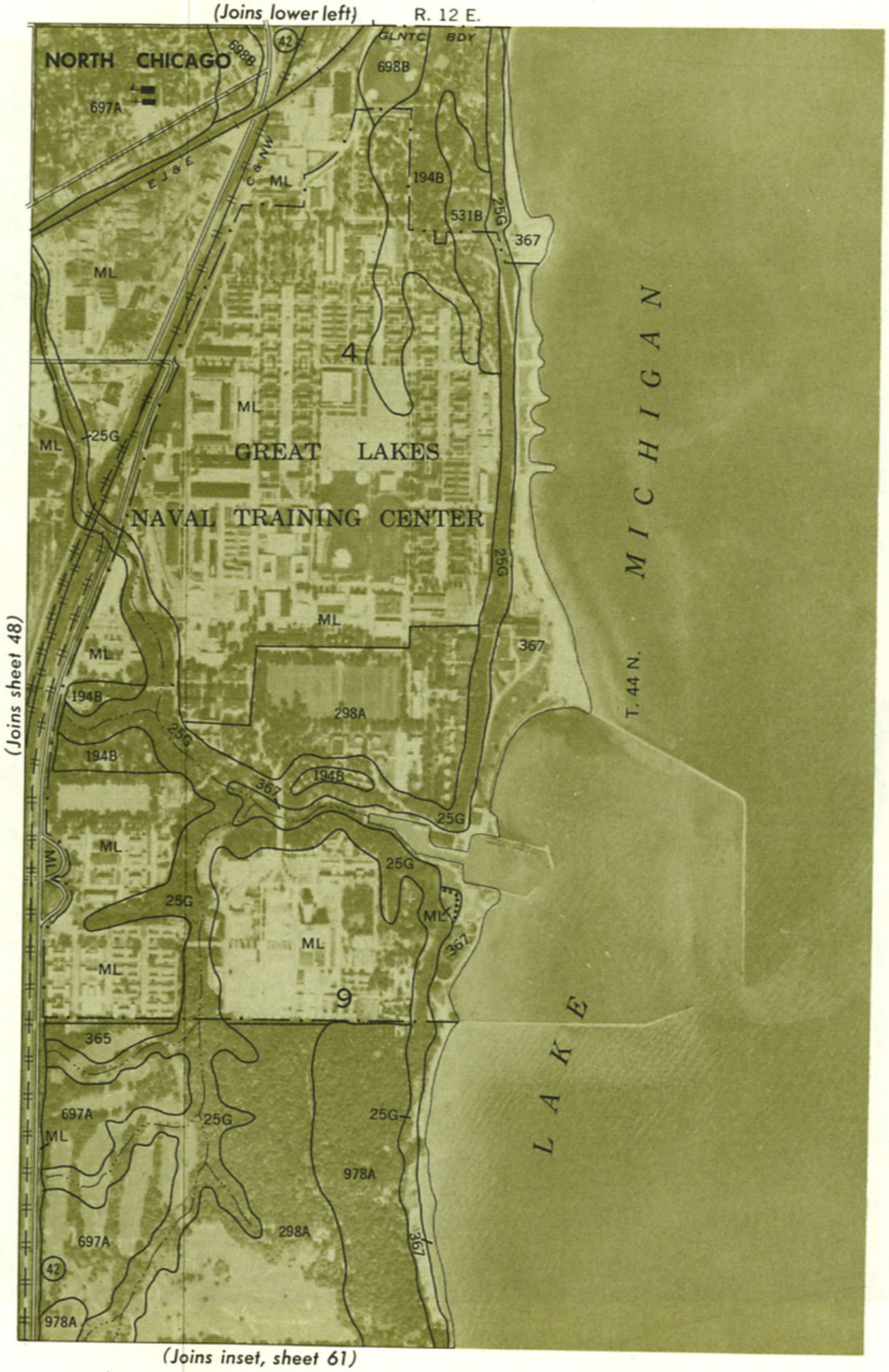
N


(Joins sheet 35)
R. 12 E.
27
28
33
WAUKEGAN
NORTH CHICAGO
LAKE MICHIGAN
T. 45 N.
ST MARYS CEMETERY
OAKWOOD CEMETERY
ELGIN JOLIET AND EASTERN
CHICAGO AND NORTH WESTERN
(Joins sheet 41)
(Joins upper right)
698A
698B
697A
327C2
25G
153
194B
194D2
BA
ML
367
120
42
G L N T C

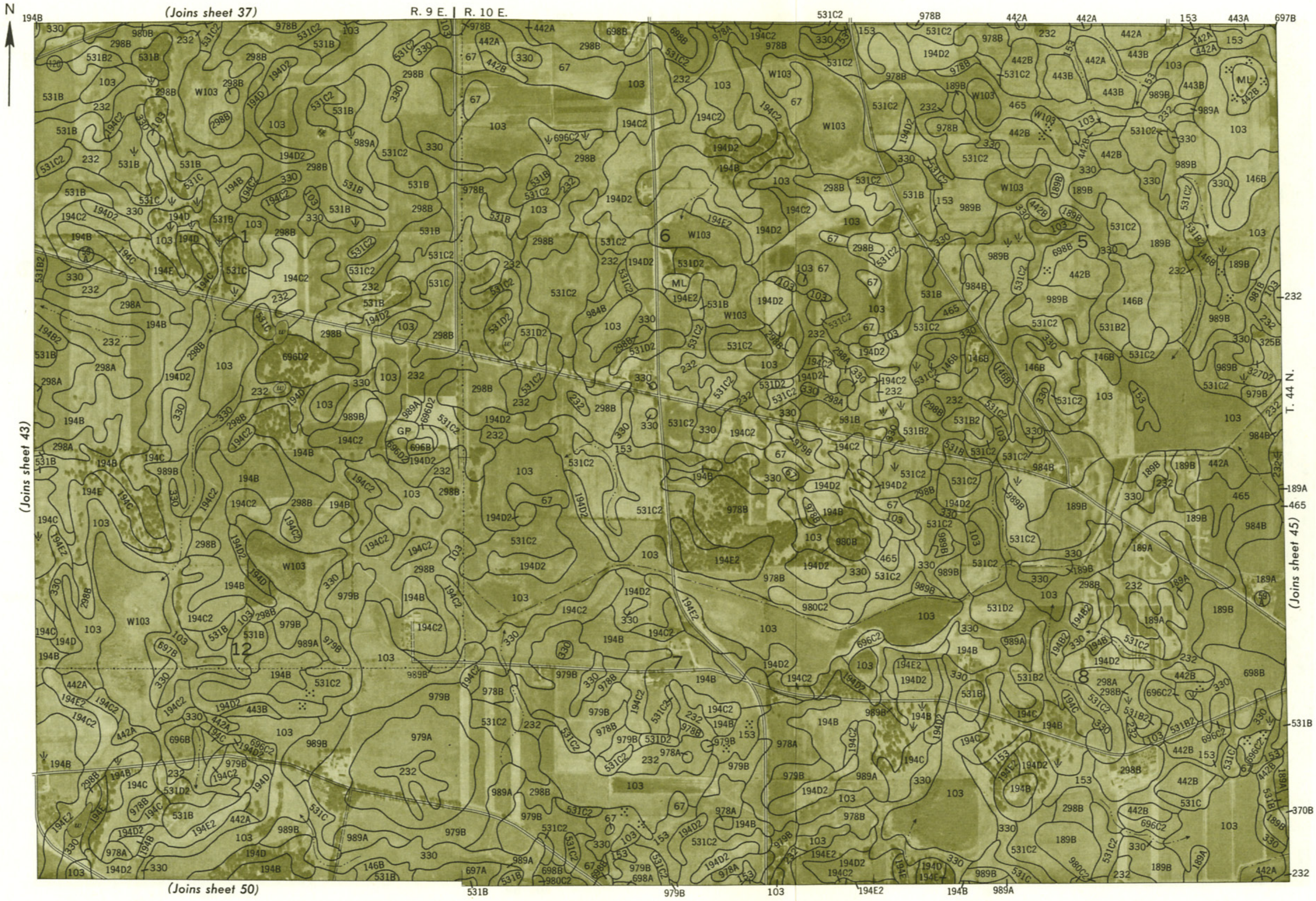

(Joins lower left)
R. 12 E.
NORTH CHICAGO
GREAT LAKES
NAVAL TRAINING CENTER
LAKE MICHIGAN
T. 44 N.
4
9
(Joins sheet 48)
(Joins inset, sheet 61)
698B
697A
194B
531B
367
ML
25G
298A
978A
355
42

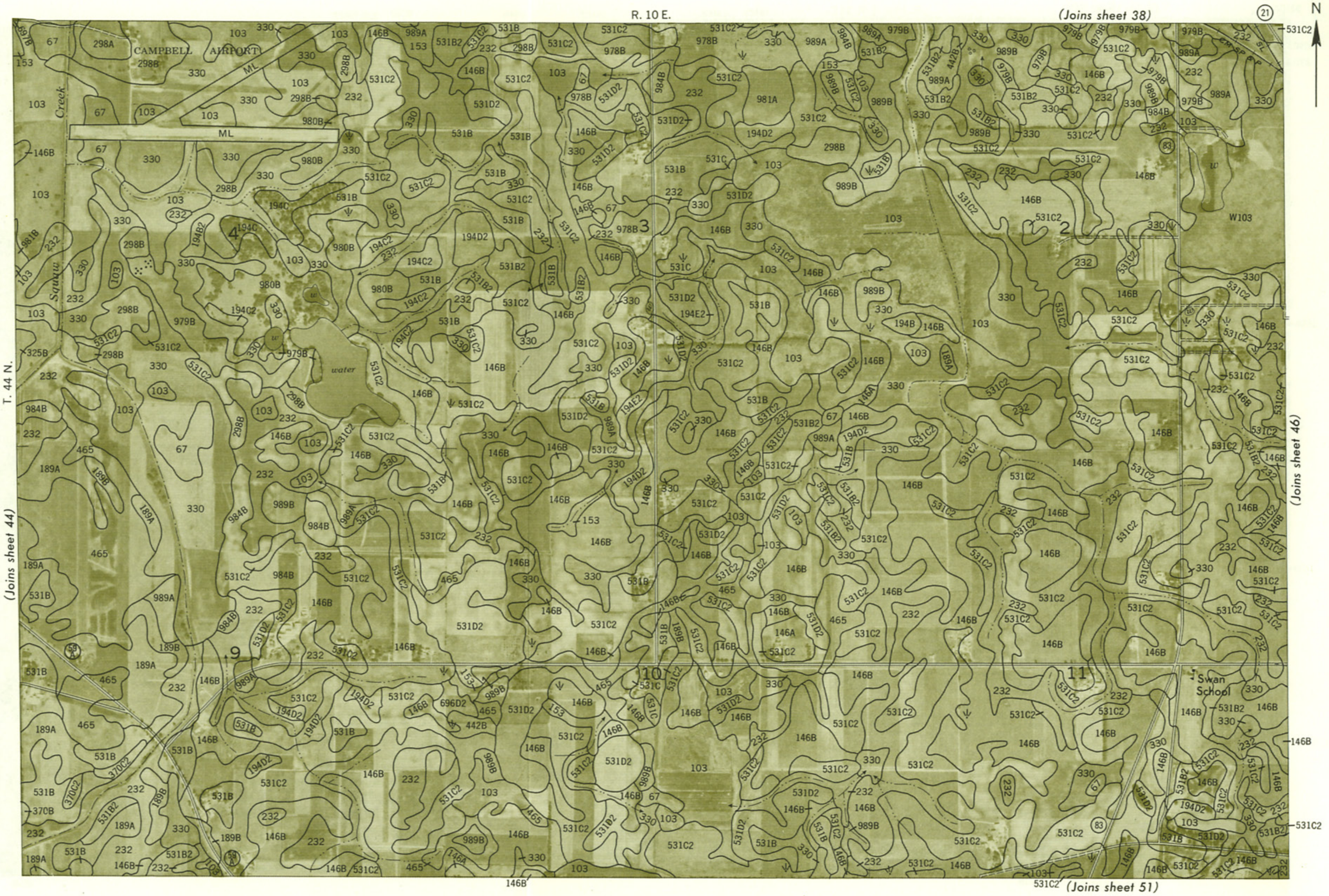
N

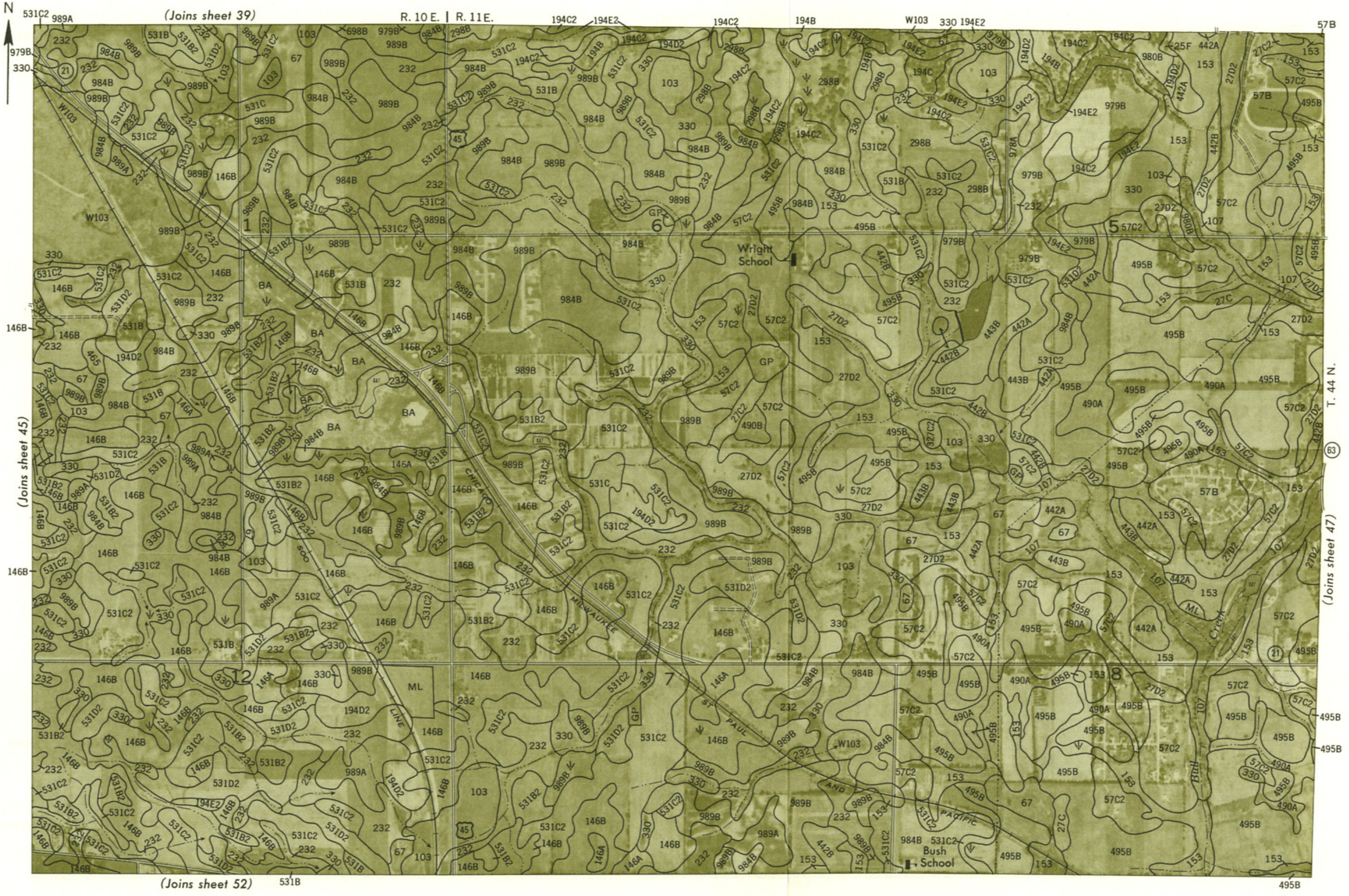

(Joins sheet 35)
R. 12 E.
27
WAUKEGAN
28
NORTH CHICAGO
33
T. 45 N.
LAKE MICHIGAN
(Joins sheet 41)
(Joins upper right)

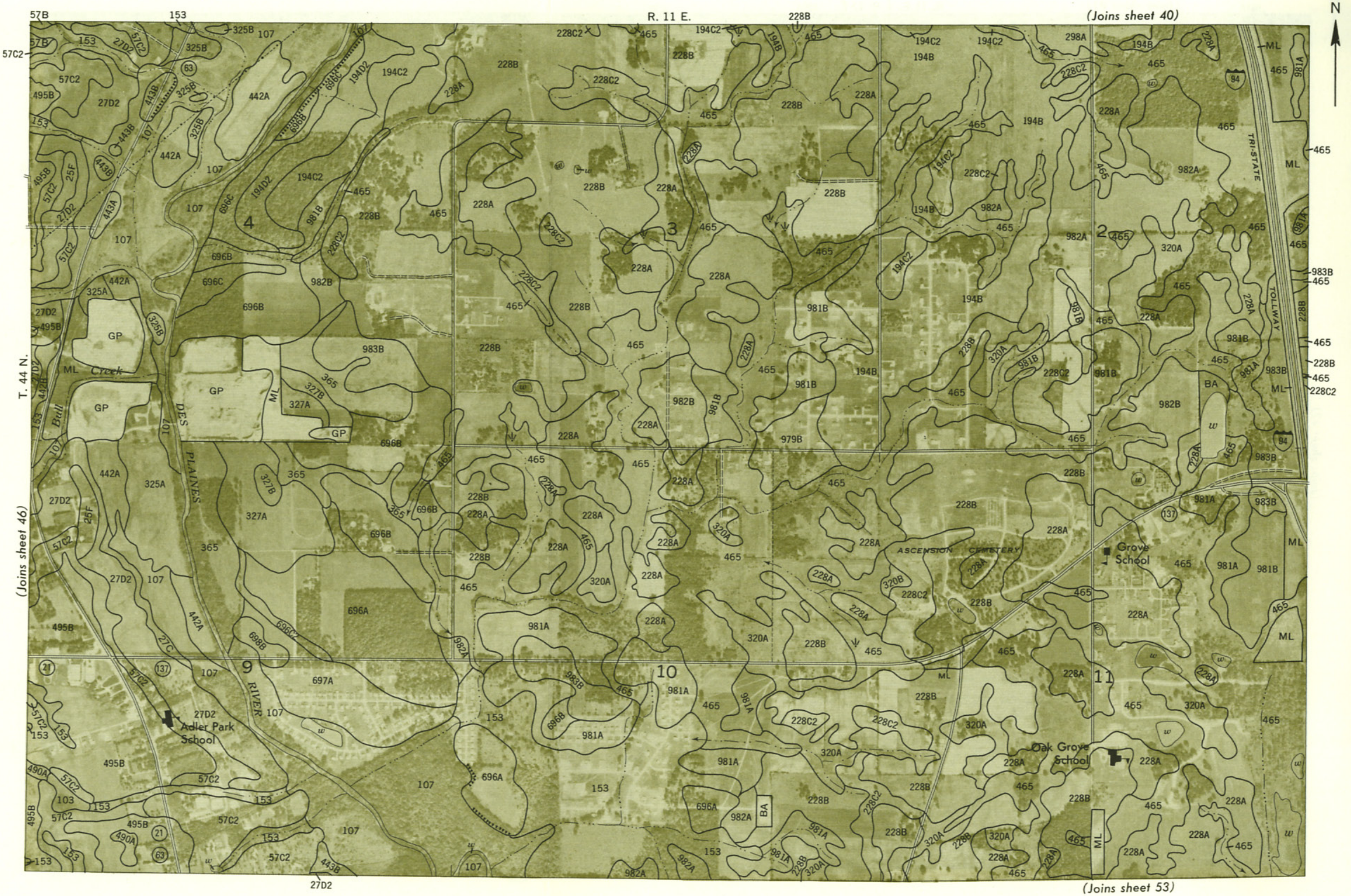

(Joins lower left)
R. 12 E.
NORTH CHICAGO
4
GREAT LAKES
NAVAL TRAINING CENTER
9
T. 44 N.
LAKE MICHIGAN
(Joins sheet 48)
(Joins inset, sheet 61)


R. 9 E.
(Joins sheet 36)
N
T. 44 N.
MC HENRY COUNTY
(Joins sheet 44)
(Joins sheet 49)
Volo
4
3
2
9
10
11

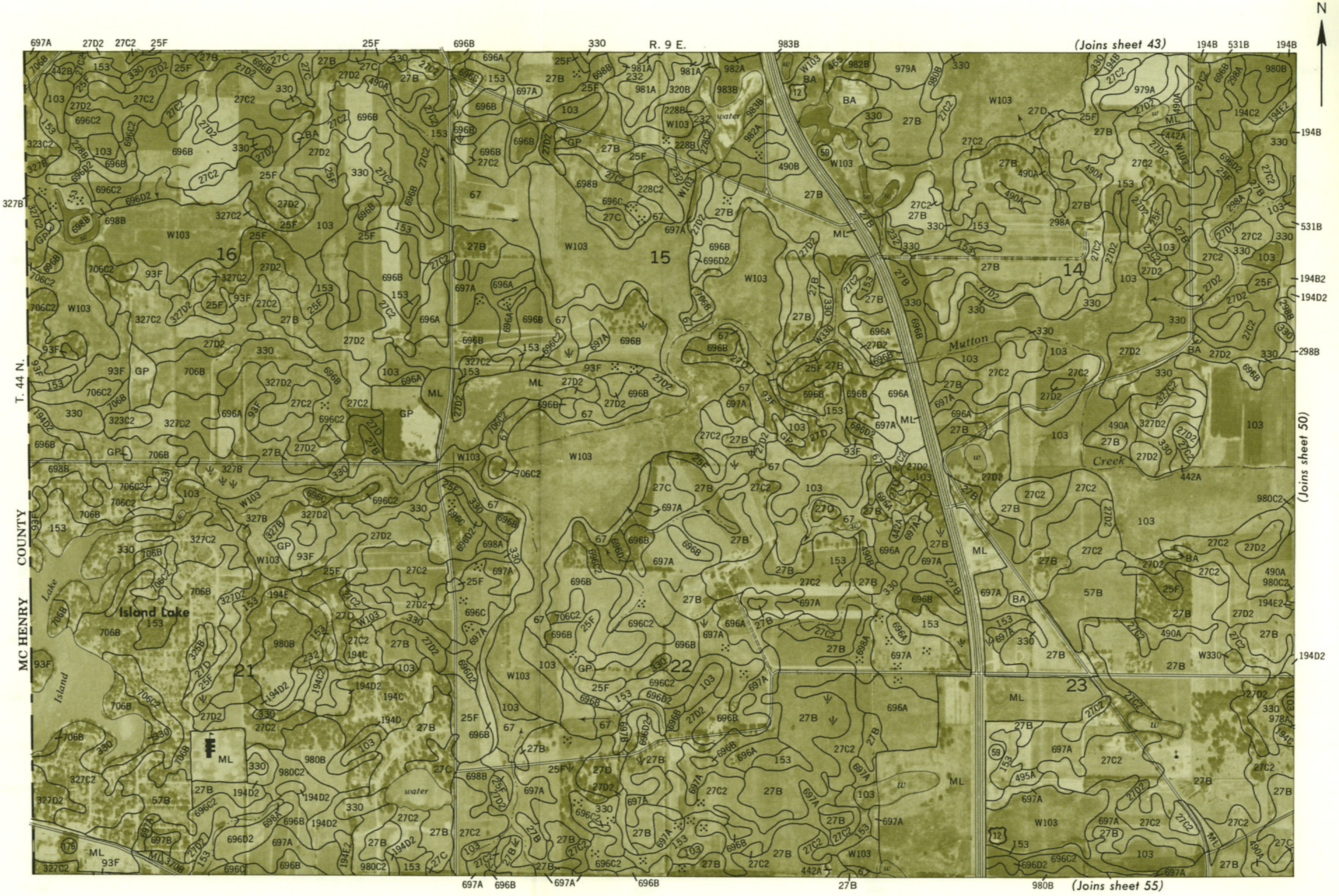

N
(Joins sheet 37)
R. 9 E.
R. 10 E.
(Joins sheet 43)
(Joins sheet 45)
T. 44 N.
(Joins sheet 50)


R. 10 E.
(Joins sheet 38)
N
T. 44 N.
(Joins sheet 44)
(Joins sheet 46)
(Joins sheet 51)
CAMPBELL AIRPORT
Squaw Creek
water
Swan School

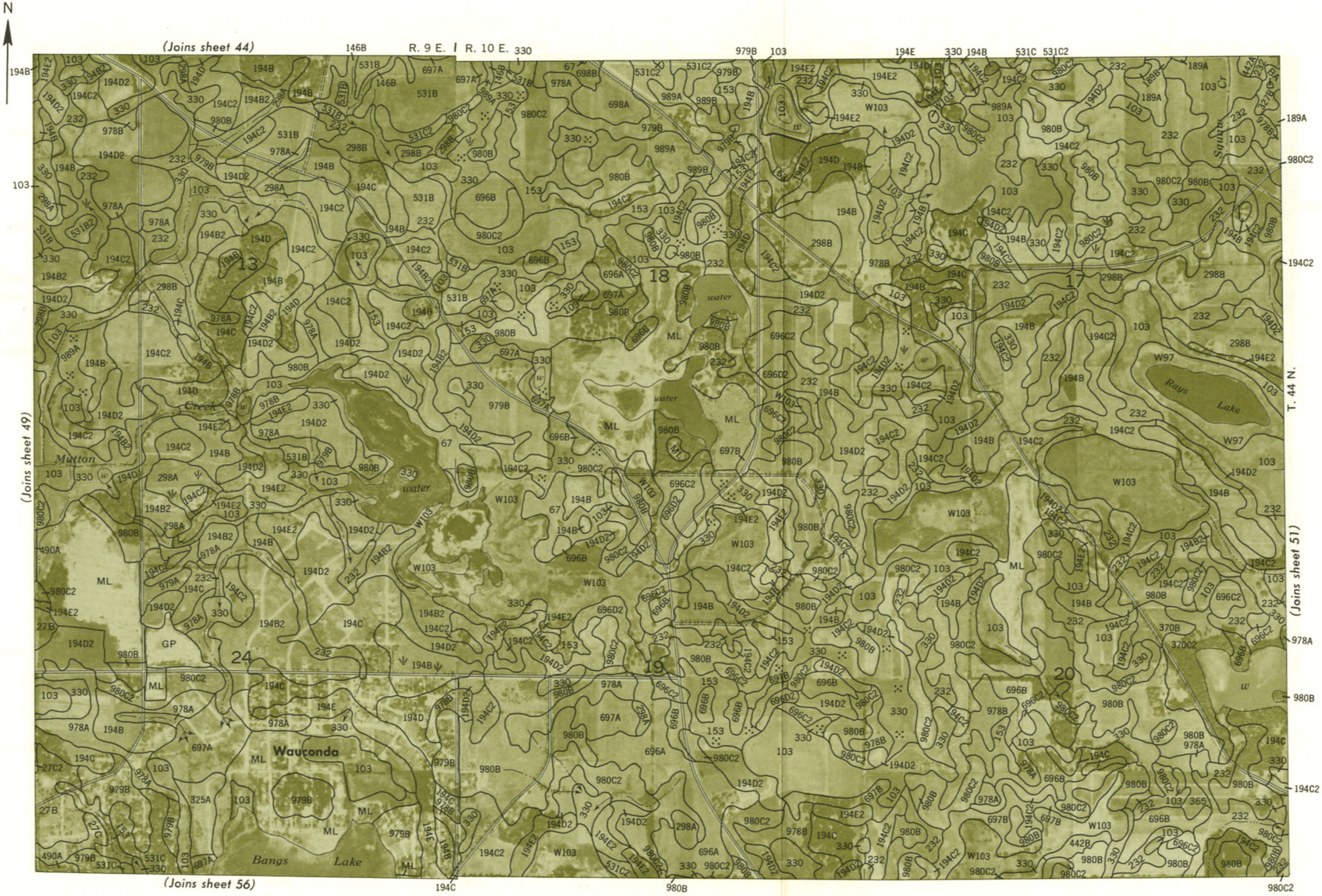

N
(Joins sheet 39)
R. 10 E. | R. 11 E.
(Joins sheet 45)
(Joins sheet 47)
(Joins sheet 52)
T. 44 N.
Wright School
Bush School
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
SOO LINE
Bull Creek
1
6
5
12
7
8

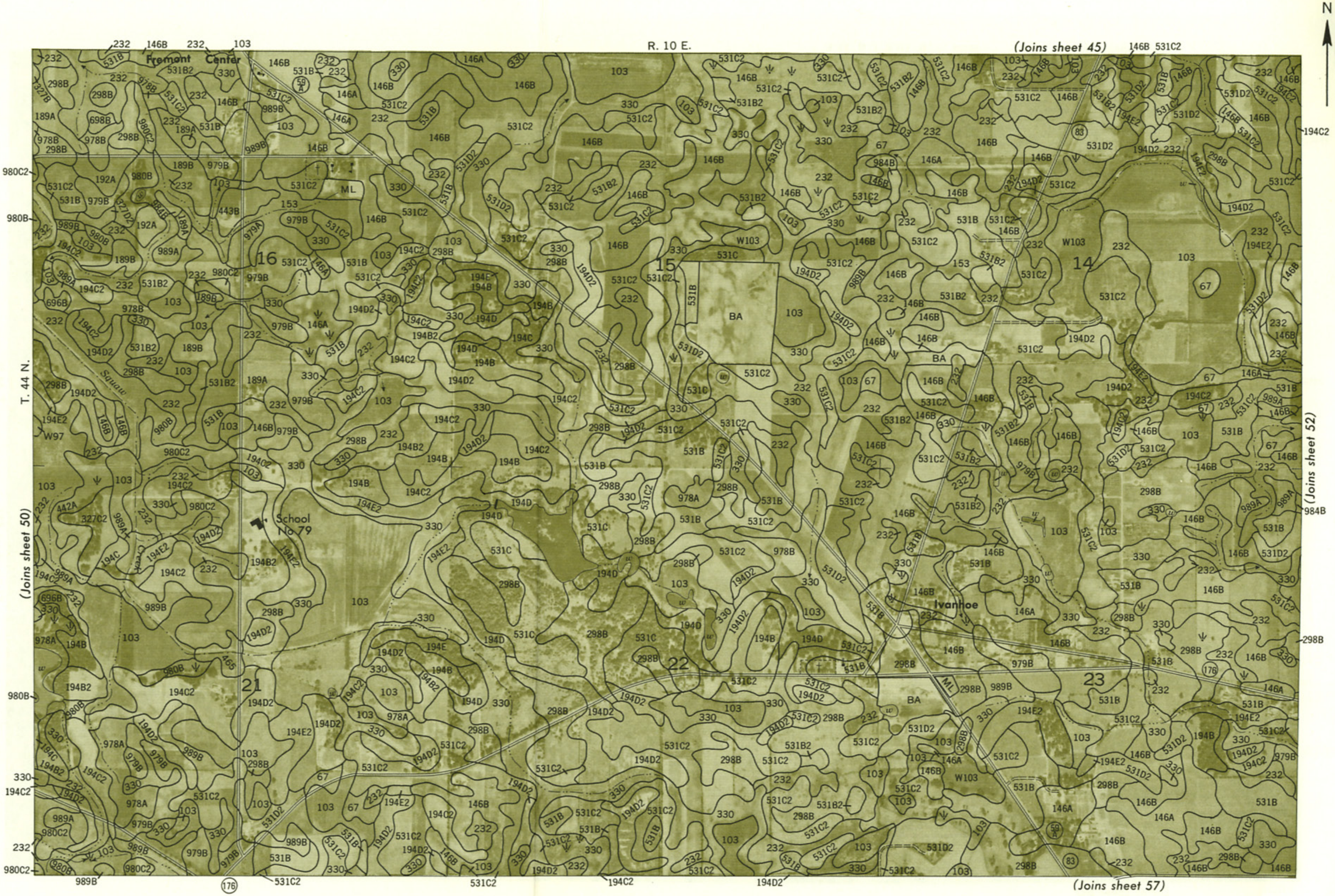

R. 11 E.
(Joins sheet 40)
N
T. 44 N.
(Joins sheet 46)
(Joins sheet 53)
DES PLAINES RIVER
Bull Creek
TRI-STATE TOLLWAY
ASCENSION CEMETERY
Grove School
Adler Park School
Oak Grove School
4
3
2
9
10
11


N
(Joins sheet 41)
R. 11 E.
R. 12 E.
(Joins sheet 47)
(Joins inset, sheet 42)
T. 44 N.
(Joins sheet 54)
NORTH CHICAGO
CHICAGO AND NORTH WESTERN
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
TRI-STATE TOLLWAY
EASTERN AND JOLIET
GREAT LAKES NAVAL TRAINING CENTER
GREAT LAKES NAVAL TRAINING CENTER
DOWNEY V A HOSPITAL
1
5
6
7
8
12


N
R. 9 E.
(Joins sheet 43)
(Joins sheet 50)
(Joins sheet 55)
T. 44 N.
MC HENRY COUNTY
Island Lake
Lake
Island
Mutton
Creek
16
15
14
21
22
23


N
KENOSHA COUNTY WISCONSIN
R. 11 E.
T. 46 N.
Russell
DES PLAINES RIVER
TRI-STATE TOLLWAY
CHICAGO MILWAUKEE ST PAUL PACIFIC
(Joins sheet 4)
(Joins sheet 6)
(Joins sheet 12)


N
(Joins sheet 44)
R. 9 E.
R. 10 E.
(Joins sheet 49)
(Joins sheet 51)
(Joins sheet 56)
T. 44 N.
13
18
17
24
19
20
Mutton
Creek
Squaw Cr
Rays Lake
Wauconda
Bangs Lake
water
ML
GP
W103
W97


N
R. 10 E.
T. 44 N.
(Joins sheet 45)
(Joins sheet 50)
(Joins sheet 52)
(Joins sheet 57)
Fremont Center
School No 79
Ivanhoe
16
15
14
21
22
23

N

(Joins sheet 46)

R. 10 E. | R. 11 E.

(Joins sheet 51)

T. 44 N.

(Joins sheet 53)

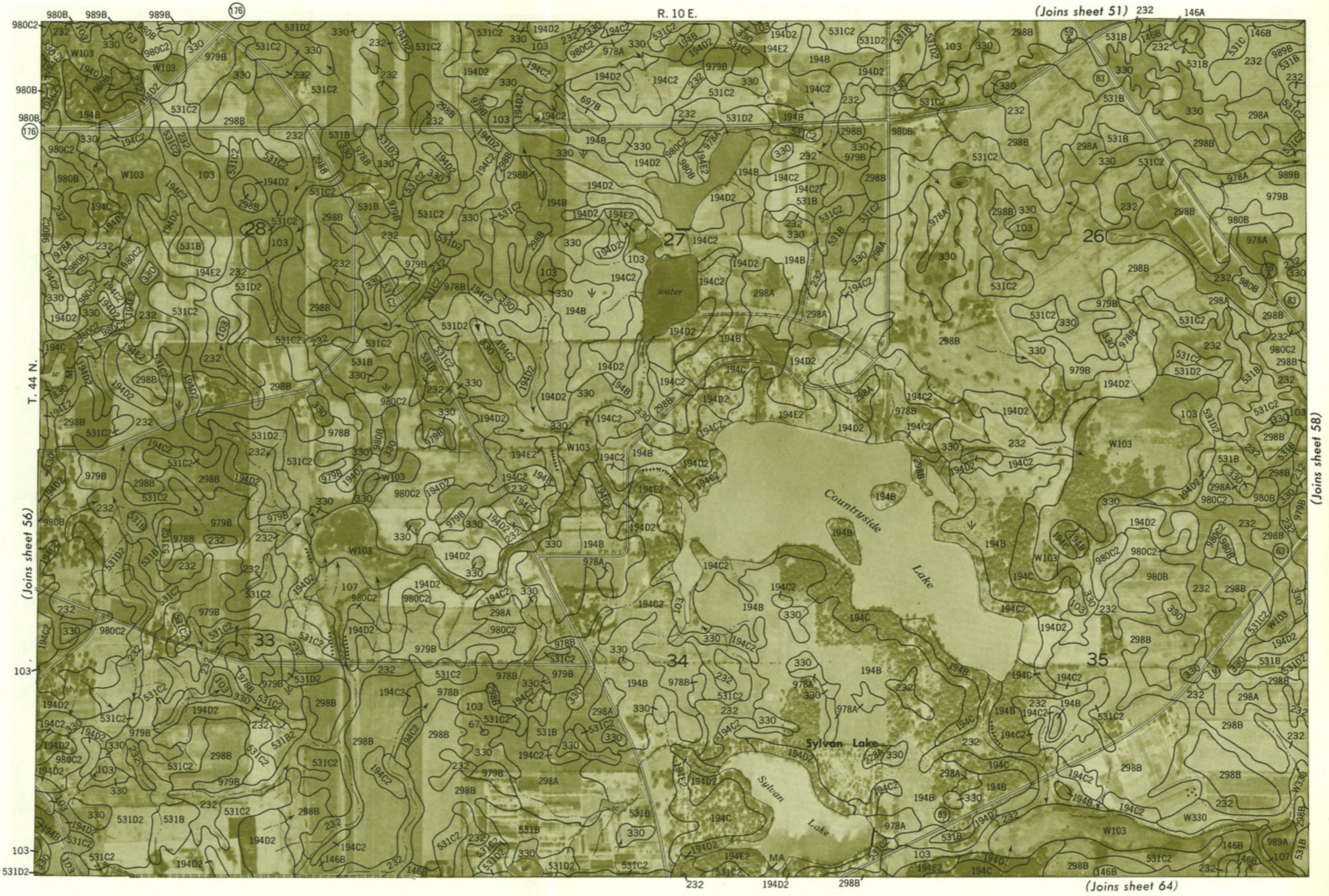
(Joins sheet 58)


N
(Joins sheet 47)
R. 11 E.
T. 44 N.
(Joins sheet 52)
(Joins sheet 54)
(Joins sheet 59)
Libertyville
Lakeside Cemetery
Butler Lake
Minear Lake
Liberty Lake
Des Plaines River
Chicago Milwaukee St Paul and Pacific
Tollway
Tristate
E J & E
water
16
15
14
21
22
23

LAKE COUNTY, ILLINOIS — SHEET NUMBER 54


R. 9 E.
(Joins sheet 49)
N
T. 44 N.
MC HENRY COUNTY
(Joins sheet 56)
(Joins sheet 62)
Mylith Park
Slocum Lake
Williams Park
Wauconda
Bangs Lake
28
27
26
33
34
35

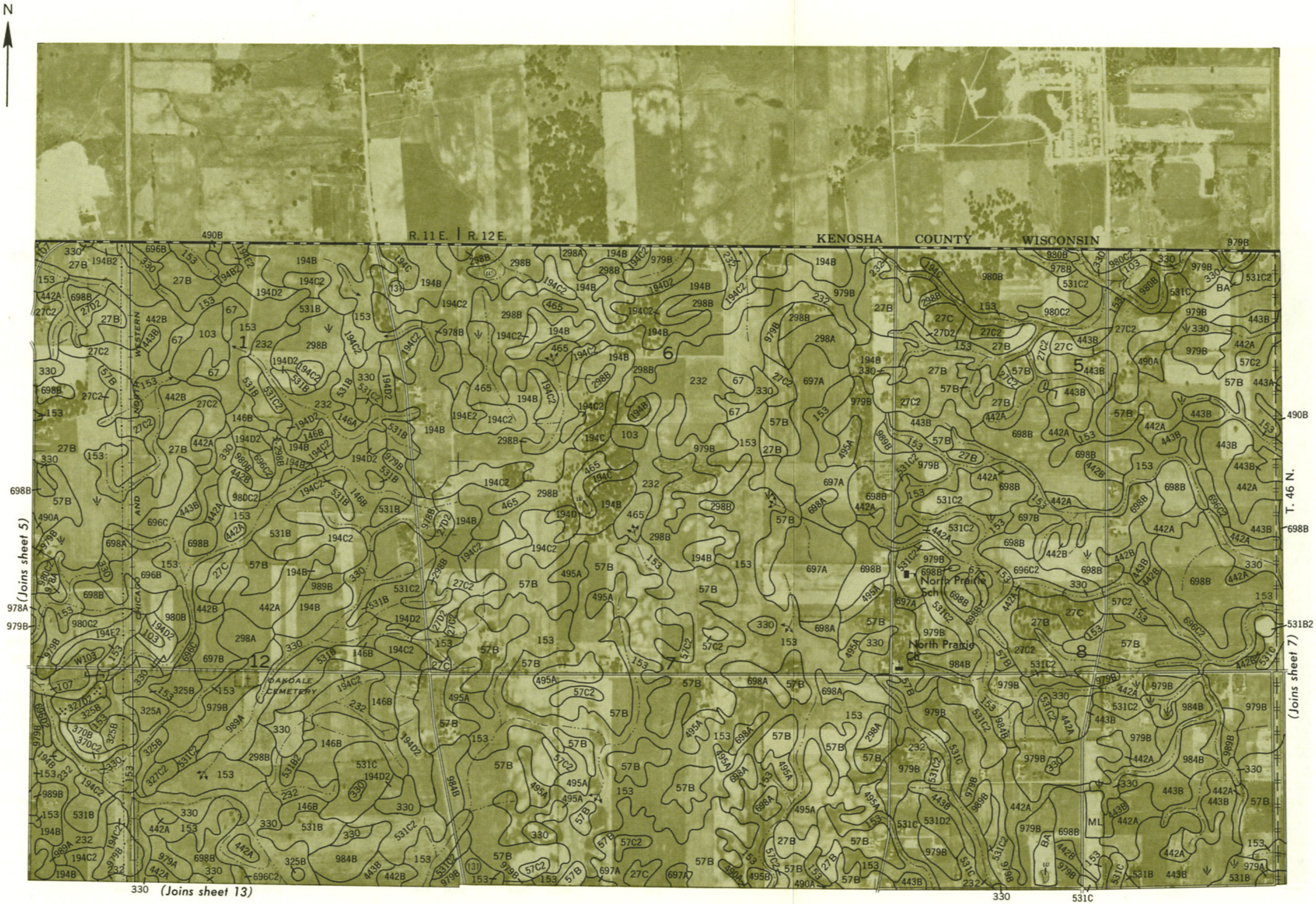

N
(Joins sheet 50)
R. 9 E.
R. 10 E.
Bangs Lake
Wauconda
TRANSFIGURATION CEMETERY
Davis Lake
Schreiber Lake
Timber Lake
25
30
29
36
31
32
T. 44 N.
(Joins sheet 55)
(Joins sheet 57)
(Joins sheet 63)
176
12


R. 10 E.
(Joins sheet 51)
(Joins sheet 58)
(Joins sheet 64)
(Joins sheet 56)
T. 44 N.
N
28
27
26
33
34
35
water
Countryside Lake
Sylvan Lake
Sylvan Lake

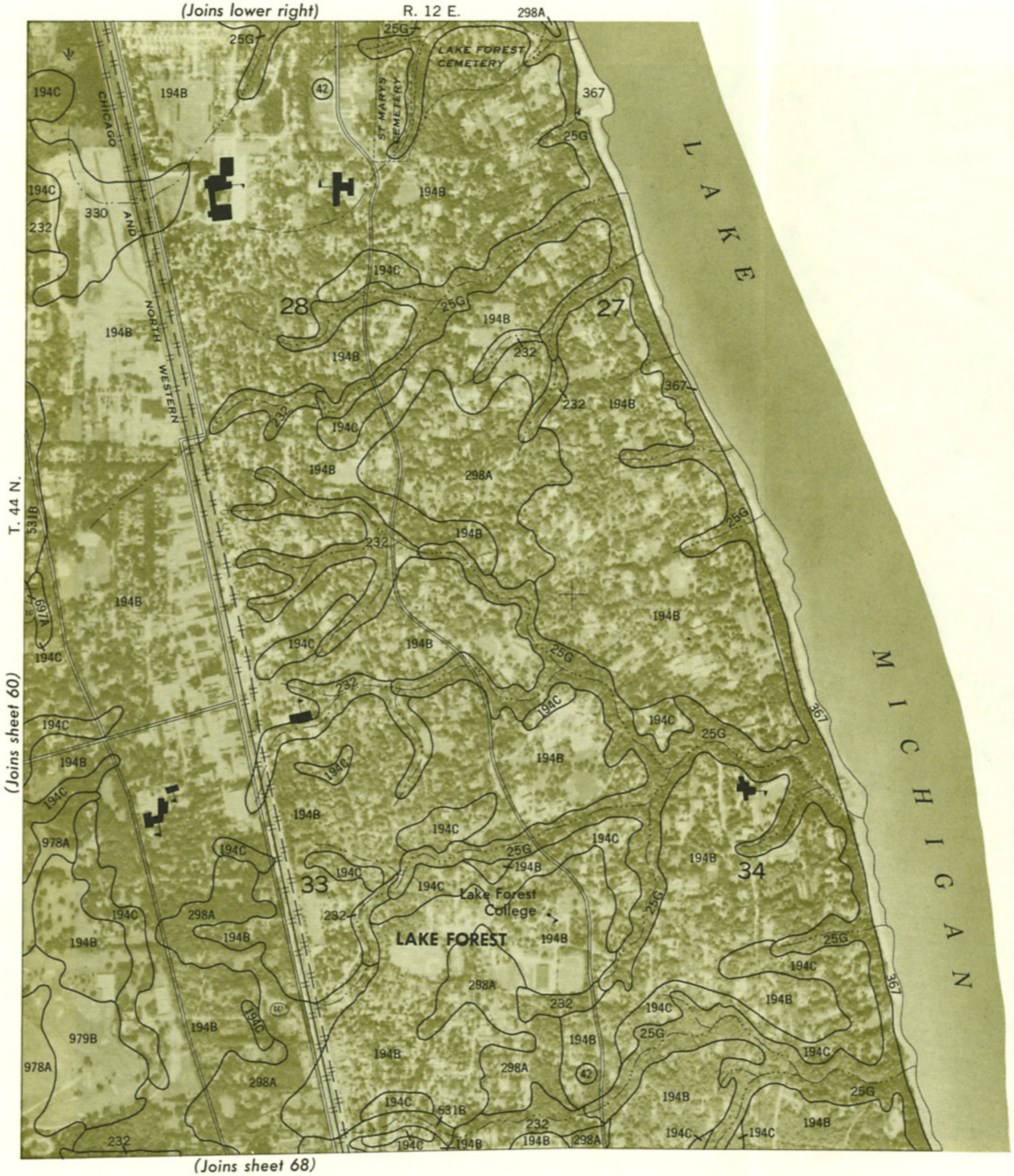

N
(Joins sheet 52)
R. 10 E.
R. 11 E.
MUNDELEIN
Fairhaven School
Diamond Lake
Diamond Lake
Lake Charles
Leithton
Hawthorn School
25
30
29
36
31
32
T. 44 N.
(Joins sheet 57)
(Joins sheet 59)
(Joins sheet 65)


R. 11 E.
(Joins sheet 53)
N
T. 44 N.
(Joins sheet 58)
(Joins sheet 60)
(Joins sheet 66)
28
27
26
33
34
35
DES PLAINES RIVER
ELGIN JOLIET AND EASTERN
TRI-STATE TOLLWAY
94
Lake Charles
SEAVEY DRAINAGE DITCH
water

LAKE COUNTY, ILLINOIS — SHEET NUMBER 6



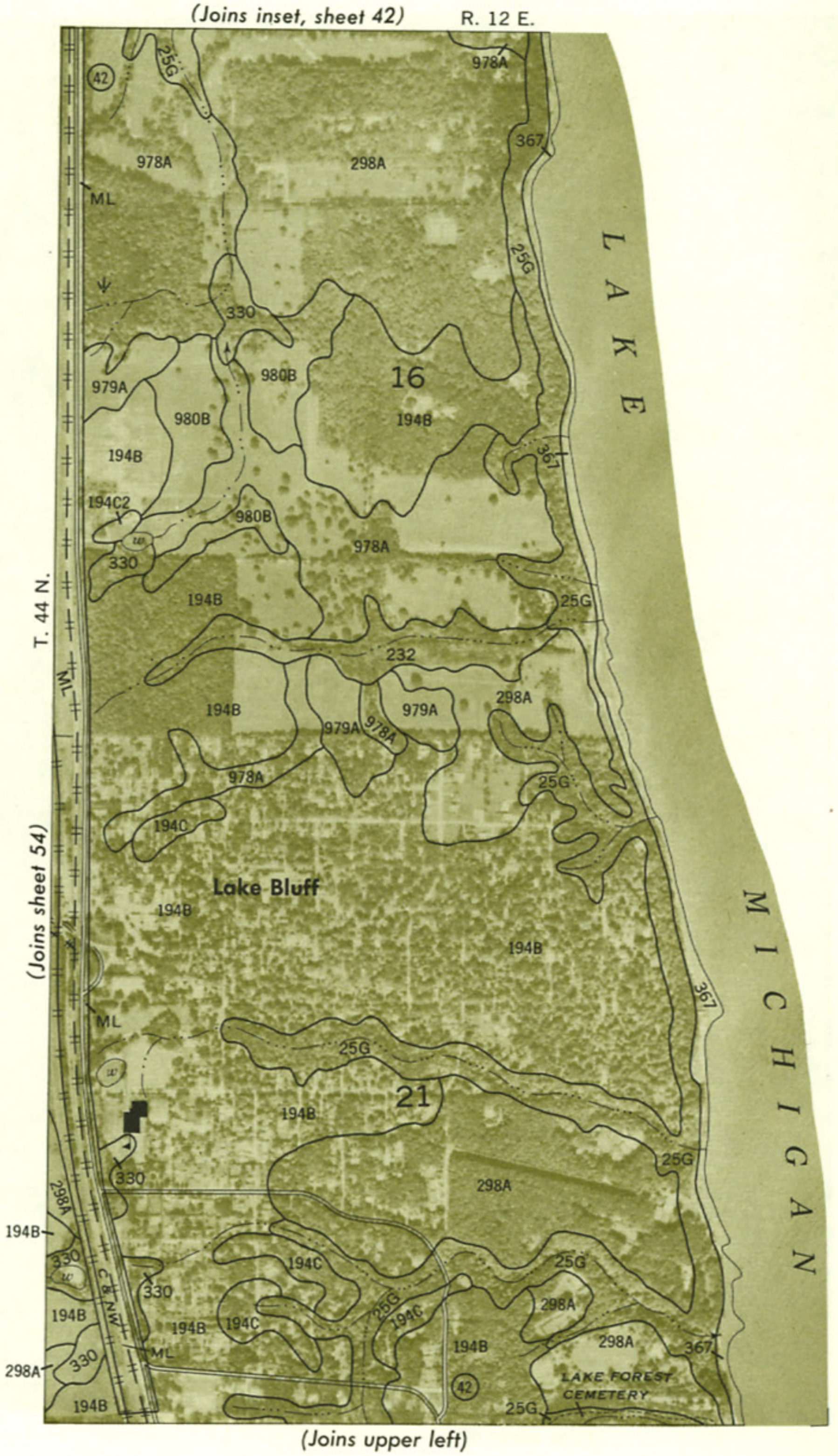

N
(Joins sheet 54)
R. 11 E.
R. 12 E.
(Joins sheet 59)
(Joins sheet 61)
(Joins sheet 67)
T. 44 N.
water
25
30
29
36
31
32
Skokie Junction
Lake Forest Academy
Deerpath
Deerpath School
Kennedy
North Branch Chicago River
Skokie River
TRI-STATE TOLLWAY
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
CHICAGO AND NORTH WESTERN
C & N W


(Joins lower right)
R. 12 E.
(Joins sheet 60)
T. 44 N.
(Joins sheet 68)
LAKE MICHIGAN
LAKE FOREST CEMETERY
ST MARYS CEMETERY
CHICAGO AND NORTH WESTERN
Lake Forest College
LAKE FOREST
28
27
33
34
194B
194C
25G
298A
232
330
367
978A
979B
531B


(Joins inset, sheet 42)
R. 12 E.
(Joins sheet 54)
T. 44 N.
(Joins upper left)
LAKE MICHIGAN
Lake Bluff
16
21
LAKE FOREST CEMETERY
978A
979A
980B
298A
194B
194C
25G
232
330
367
ML

N


(Joins lower right)
R. 12 E.
LAKE FOREST CEMETERY
ST. MARY'S CEMETERY
CHICAGO AND NORTH WESTERN
LAKE
MICHIGAN
28
27
33
34
T. 44 N.
(Joins sheet 60)
Lake Forest College
LAKE FOREST
(Joins sheet 68)

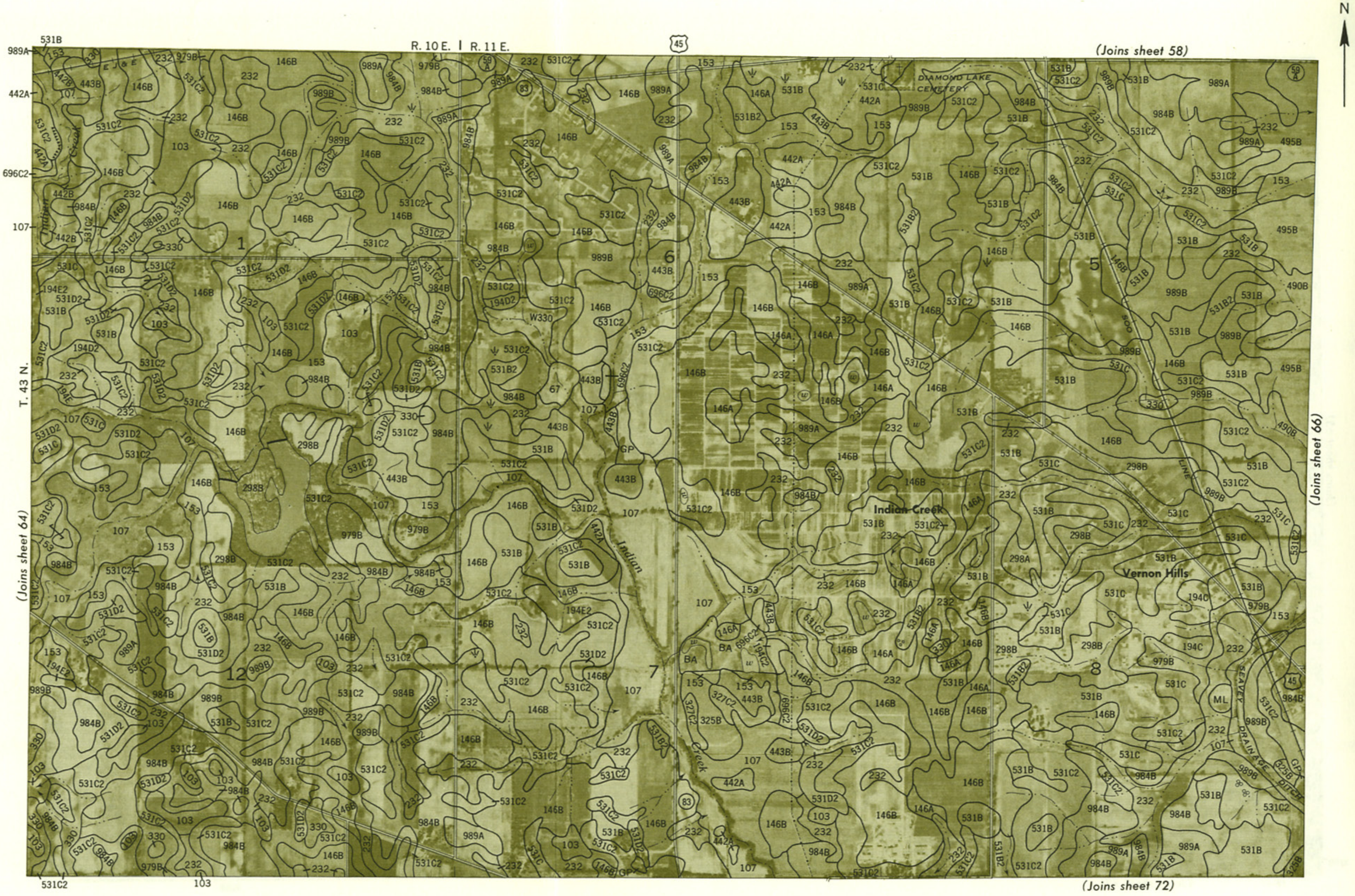

(Joins inset, sheet 42)
R. 12 E.
LAKE
MICHIGAN
16
21
T. 44 N.
(Joins sheet 54)
Lake Bluff
C. & N.W.
LAKE FOREST CEMETERY
(Joins upper left)

N


N
(Joins sheet 55)
R. 9 E.
T. 43 N.
(Joins sheet 63)
(Joins sheet 69)
MC HENRY COUNTY
FOX RIVER
Tower Lake
Lake Barrington
Lake Barrington
Flint Creek
Landing Field
4
3
2
9
10
11

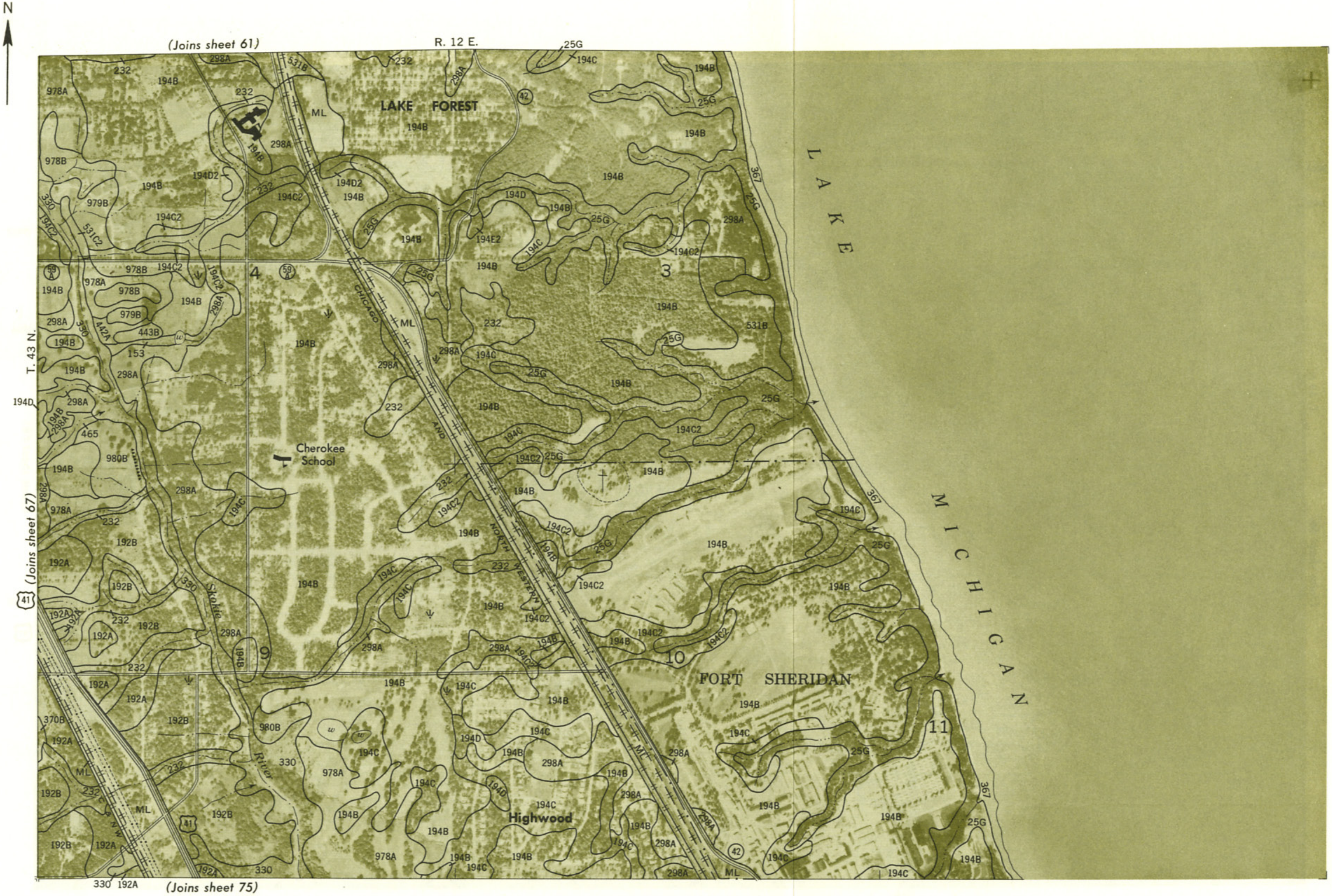

N
R. 9 E.
R. 10 E.
T. 43 N.
(Joins sheet 56)
(Joins sheet 62)
(Joins sheet 64)
(Joins sheet 70)
Timber Lake
Lake Corner
Hubbard School

LAKE COUNTY, ILLINOIS — SHEET NUMBER 64


N
R. 10 E.
R. 11 E.
(Joins sheet 58)
(Joins sheet 64)
(Joins sheet 66)
(Joins sheet 72)
T. 43 N.
Diamond Lake Cemetery
Indian Creek
Vernon Hills
Indian Creek
Seavey Drainage Ditch
Soo Line
E J & E
1
5
6
7
8
12

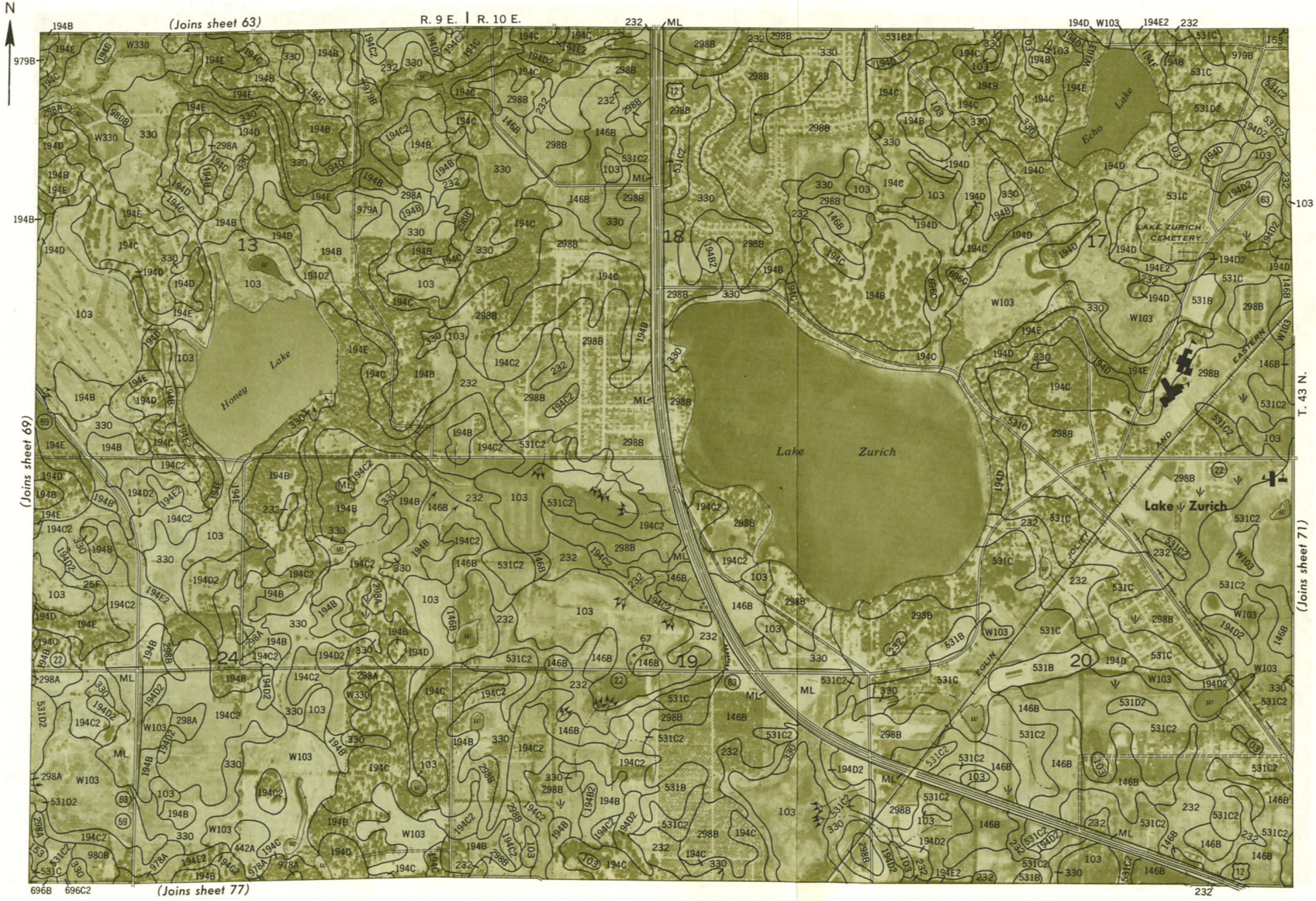

N
(Joins sheet 59)
R. 11 E.
(Joins sheet 65)
(Joins sheet 67)
T. 43 N.
(Joins sheet 73)
Mettawa
SEAVEY DRAINAGE DITCH
DES PLAINES RIVER
U S MILITARY RESERVATION
ML
GP
BA
SOO LINE

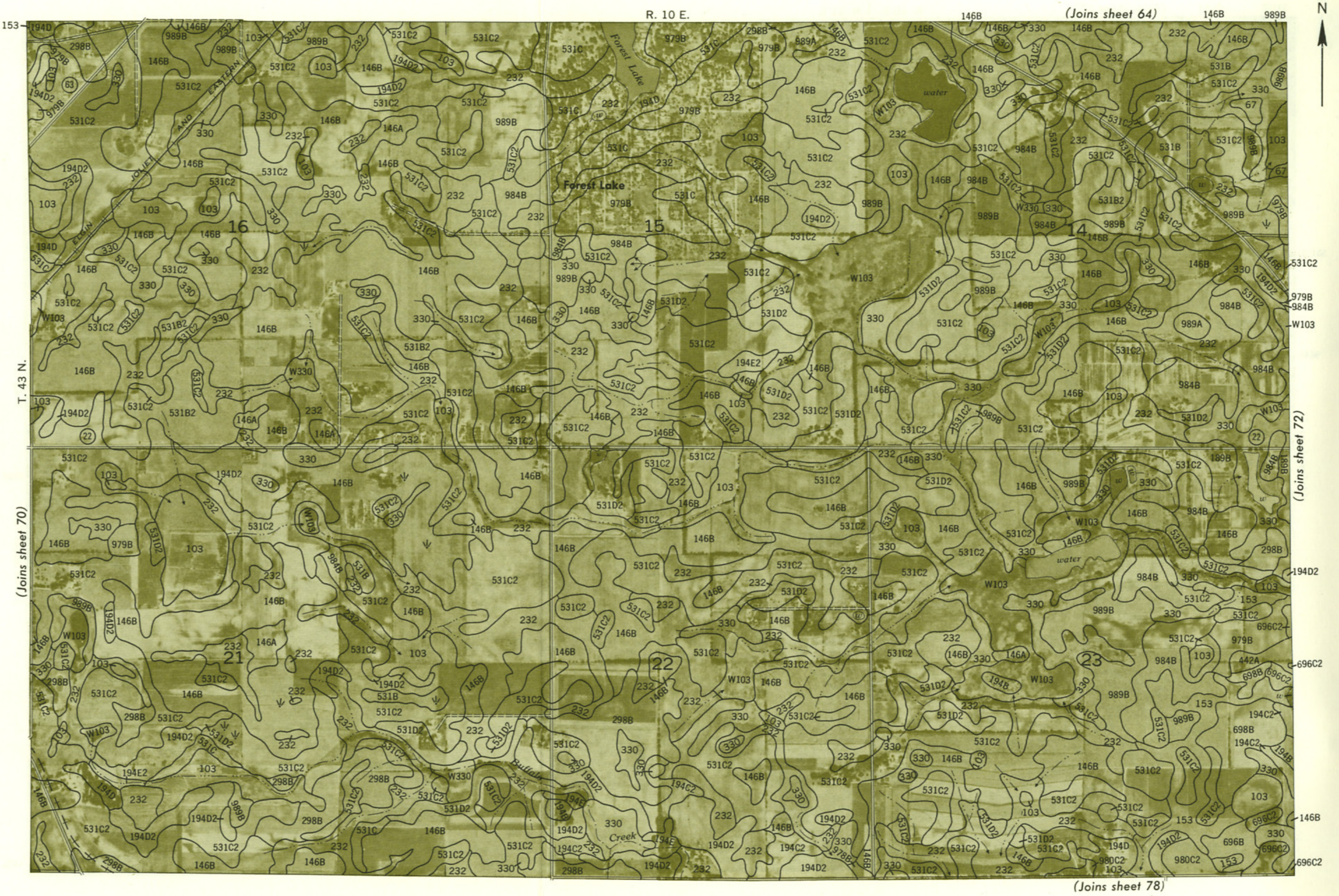

N
R. 11 E. | R. 12 E.
(Joins sheet 60)
(Joins sheet 66)
(Joins sheet 68)
(Joins sheet 74)
T. 43 N.
TRI-STATE
TOLLWAY
CHICAGO MILWAUKEE ST PAUL AND PACIFIC
CHICAGO AND NORTH WESTERN
North Branch
Chicago River
Skokie River
West Lake Forest
Everett School

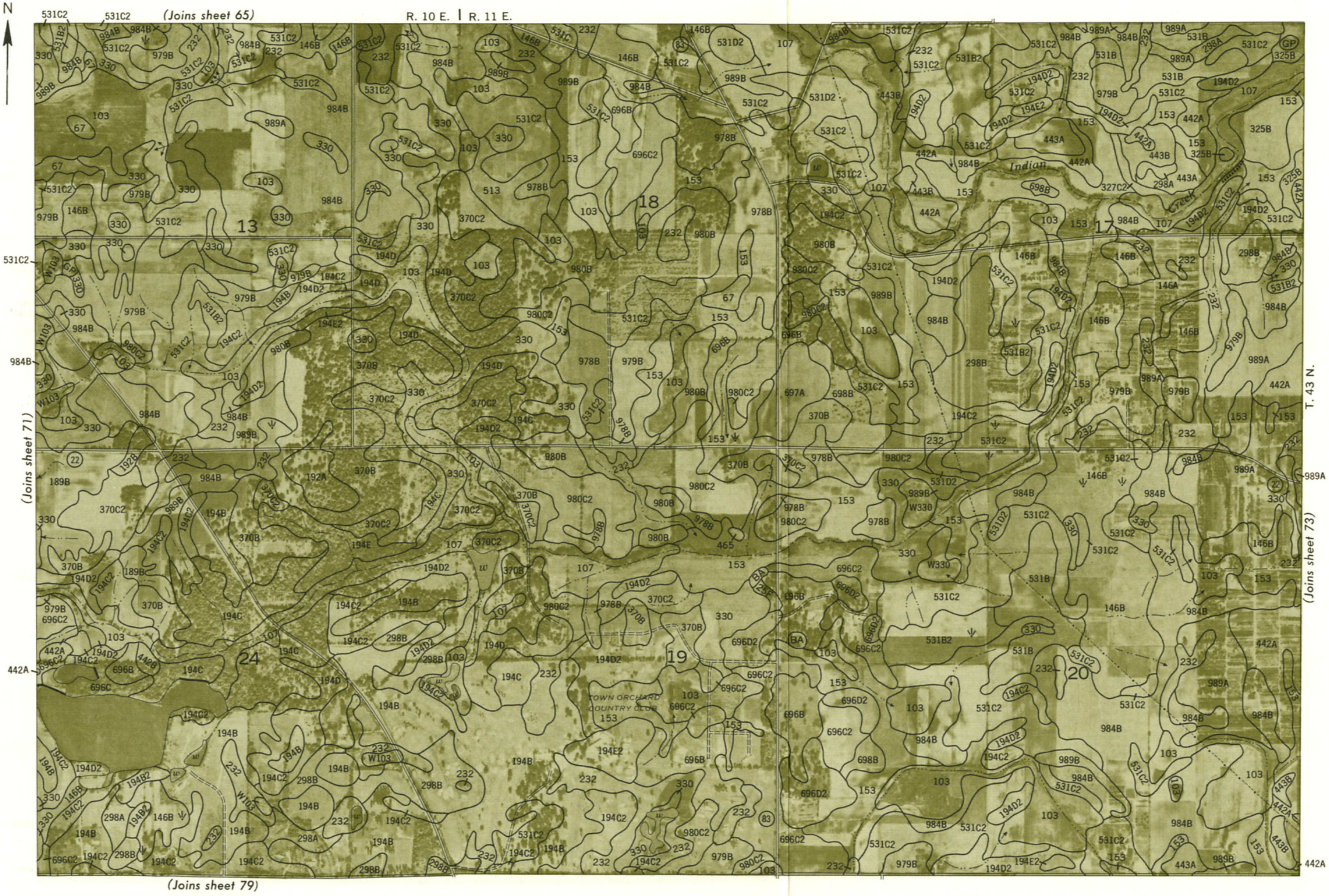

N
(Joins sheet 61)
R. 12 E.
T. 43 N.
(Joins sheet 67)
(Joins sheet 75)
LAKE FOREST
Cherokee School
Highwood
FORT SHERIDAN
LAKE MICHIGAN
CHICAGO AND NORTH WESTERN
Skokie River
41
42
59A
4
3
9
10
11


R. 9 E.
(Joins sheet 62)
N
North Barrington
Grassy Lake
FOX RIVER
Flint Creek
T. 43 N.
MC HENRY COUNTY
(Joins sheet 70)
(Joins sheet 76)
16
15
14
21
22
23

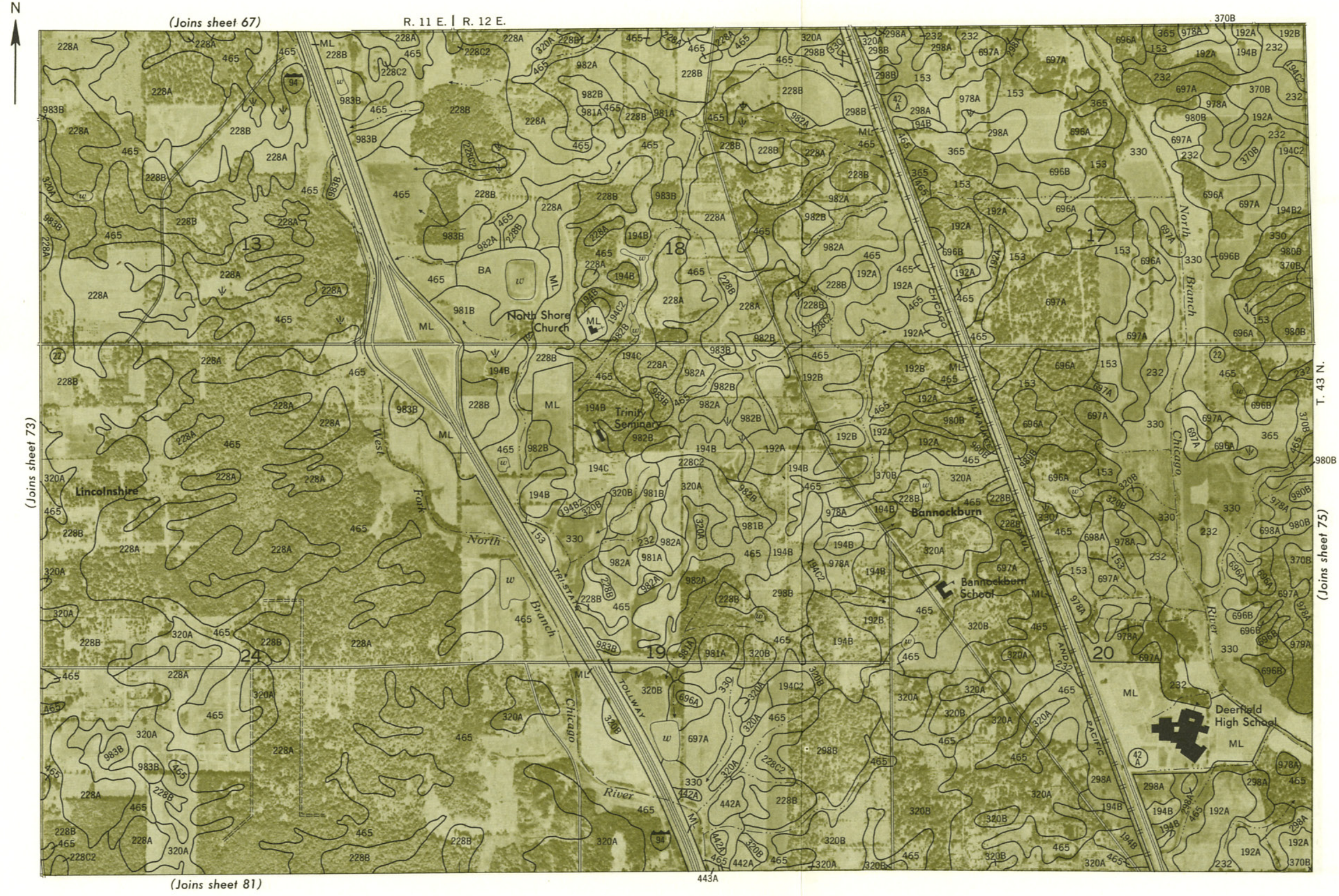

N
KENOSHA COUNTY WISCONSIN
R. 12 E.
T. 46 N.
(Joins sheet 6)
Winthrop Harbor
West Field Jr High School
NORTH WESTERN
AND
CHICAGO
LAKE
MICHIGAN
(Joins sheet 14)


N
(Joins sheet 63)
R. 9 E. | R. 10 E.
(Joins sheet 69)
(Joins sheet 71)
(Joins sheet 77)
T. 43 N.
Honey Lake
Lake Zurich
Echo Lake
LAKE ZURICH CEMETERY
Lake Zurich
EASTERN AND JOLIET
ELGIN
13
18
17
24
19
20


R. 10 E.
(Joins sheet 64)
N
T. 43 N.
(Joins sheet 70)
(Joins sheet 72)
(Joins sheet 78)
Forest Lake
Forest Lake
16
15
14
21
22
23
water
water
Buffalo
Creek

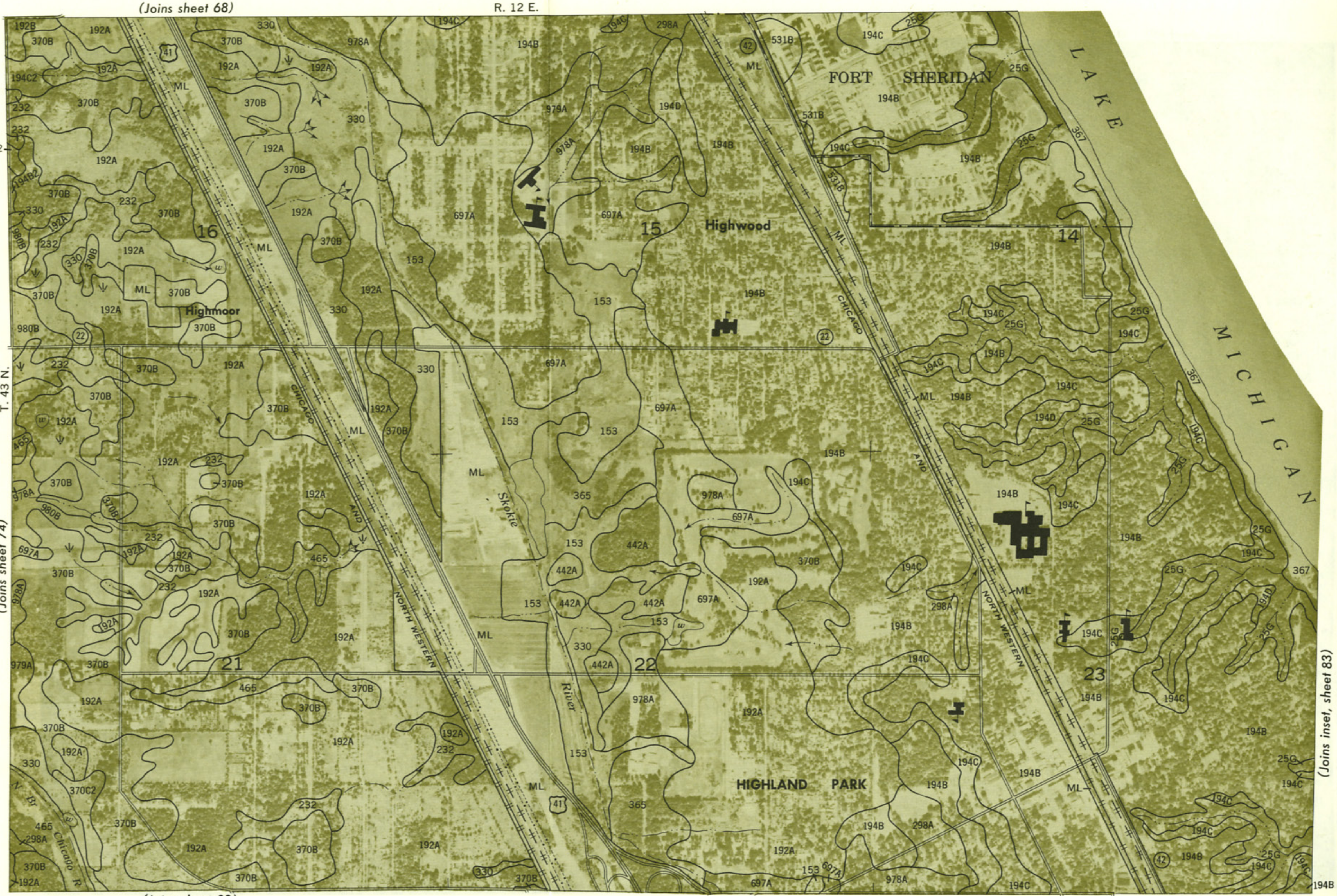

N
(Joins sheet 65)
R. 10 E. | R. 11 E.
(Joins sheet 71)
T. 43 N.
(Joins sheet 73)
(Joins sheet 79)
13
18
17
24
19
20
Indian Creek
TOWN ORCHARD COUNTRY CLUB


R. 11 E.
(Joins sheet 66)
N
T. 43 N.
(Joins sheet 72)
(Joins sheet 74)
(Joins sheet 80)
16
15
14
21
22
23
VERNON CEMETERY
Half Day
Indian
Creek
Prairie View
CHICAGOLAND
AIRPORT
DES
PLAINES
RIVER
Lincolnshire
ML
BA
GP


N
(Joins sheet 67)
R. 11 E. | R. 12 E.
(Joins sheet 73)
(Joins sheet 75)
(Joins sheet 81)
T. 43 N.
Lincolnshire
North Shore Church
Trinity Seminary
Bannockburn
Bannockburn School
Deerfield High School
West Fork North Branch
Chicago River
North Branch Chicago River
Tollway
Chicago Milwaukee St. Paul and Pacific
13
18
17
24
19
20

(Joins sheet 68)

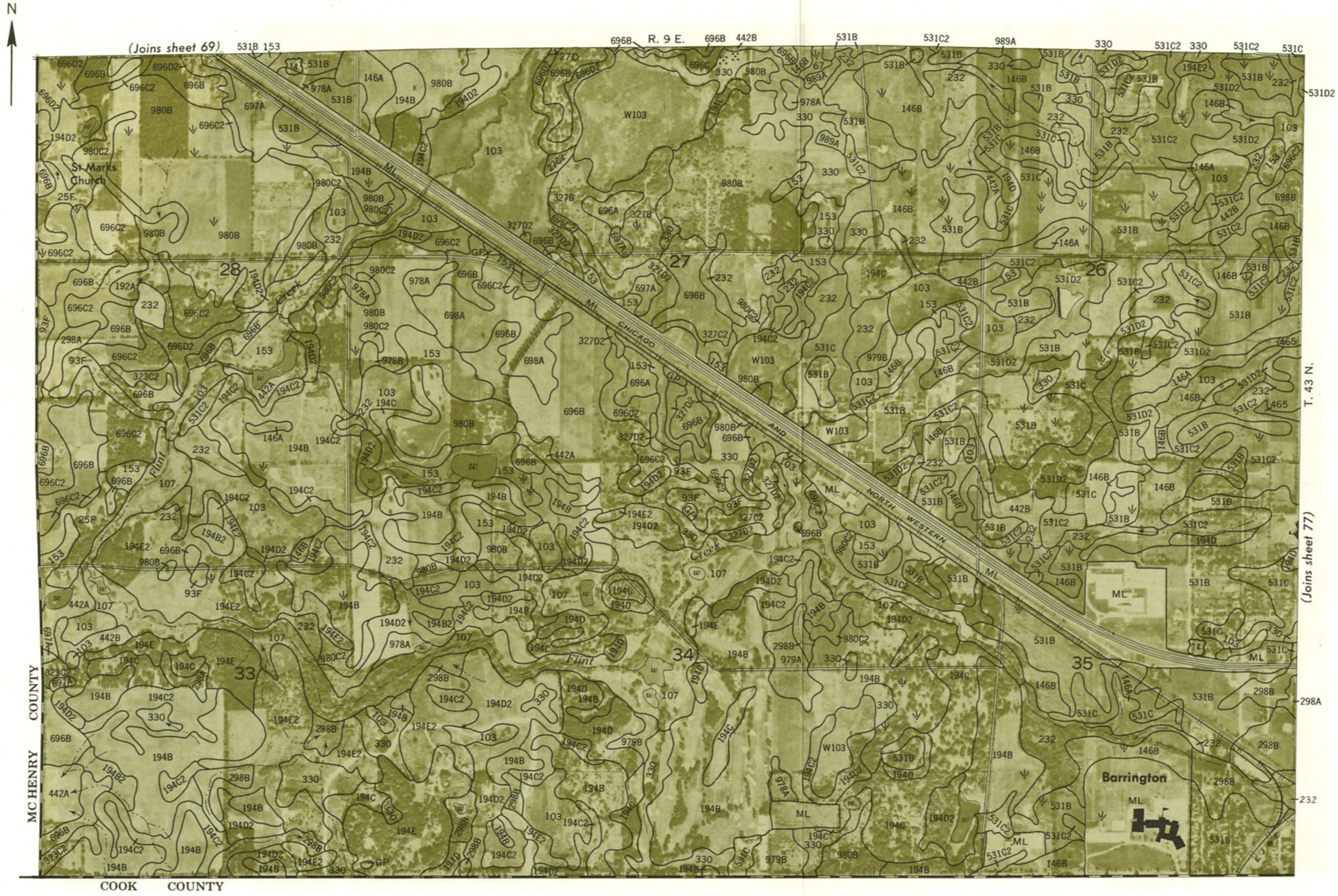
R. 12 E.

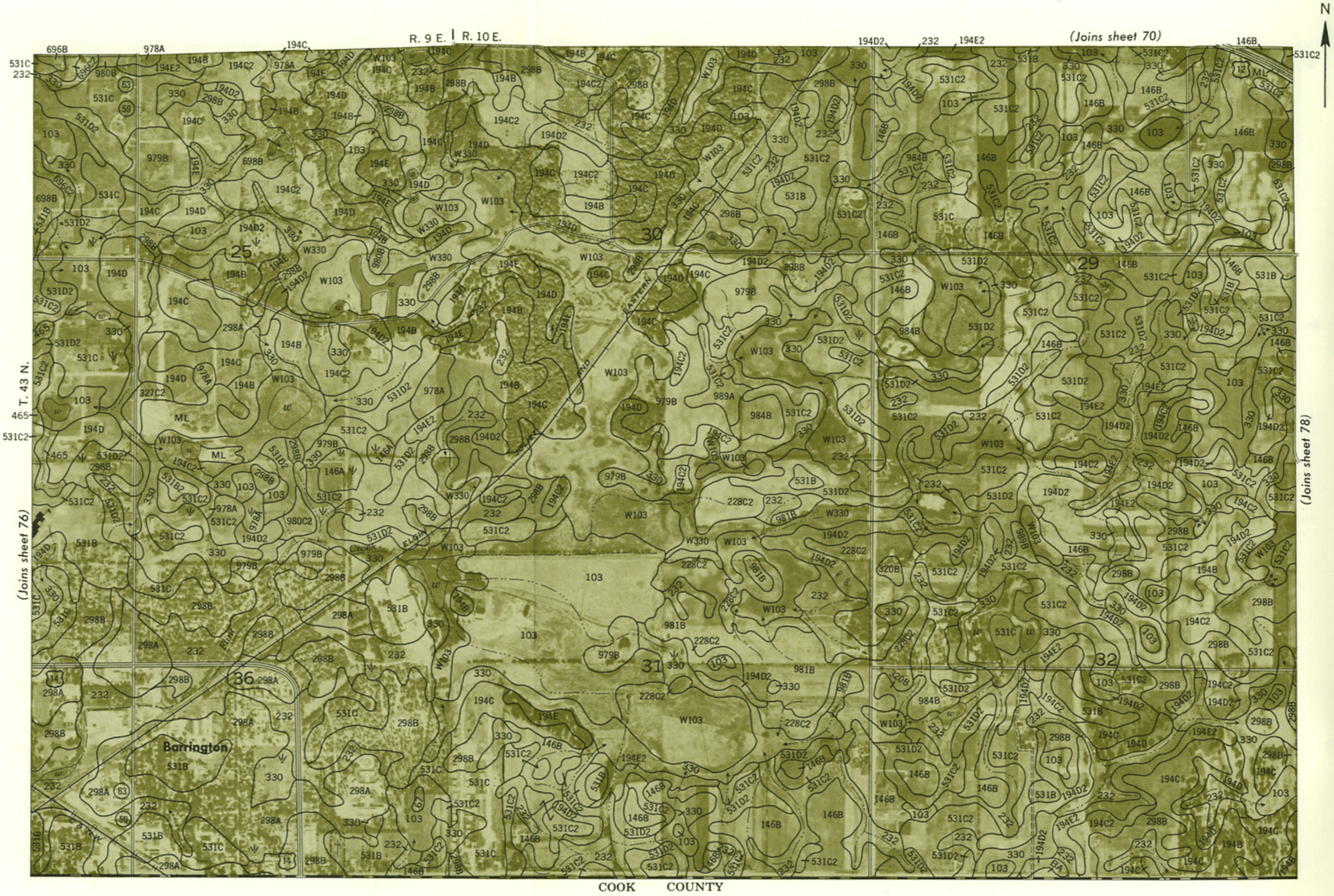


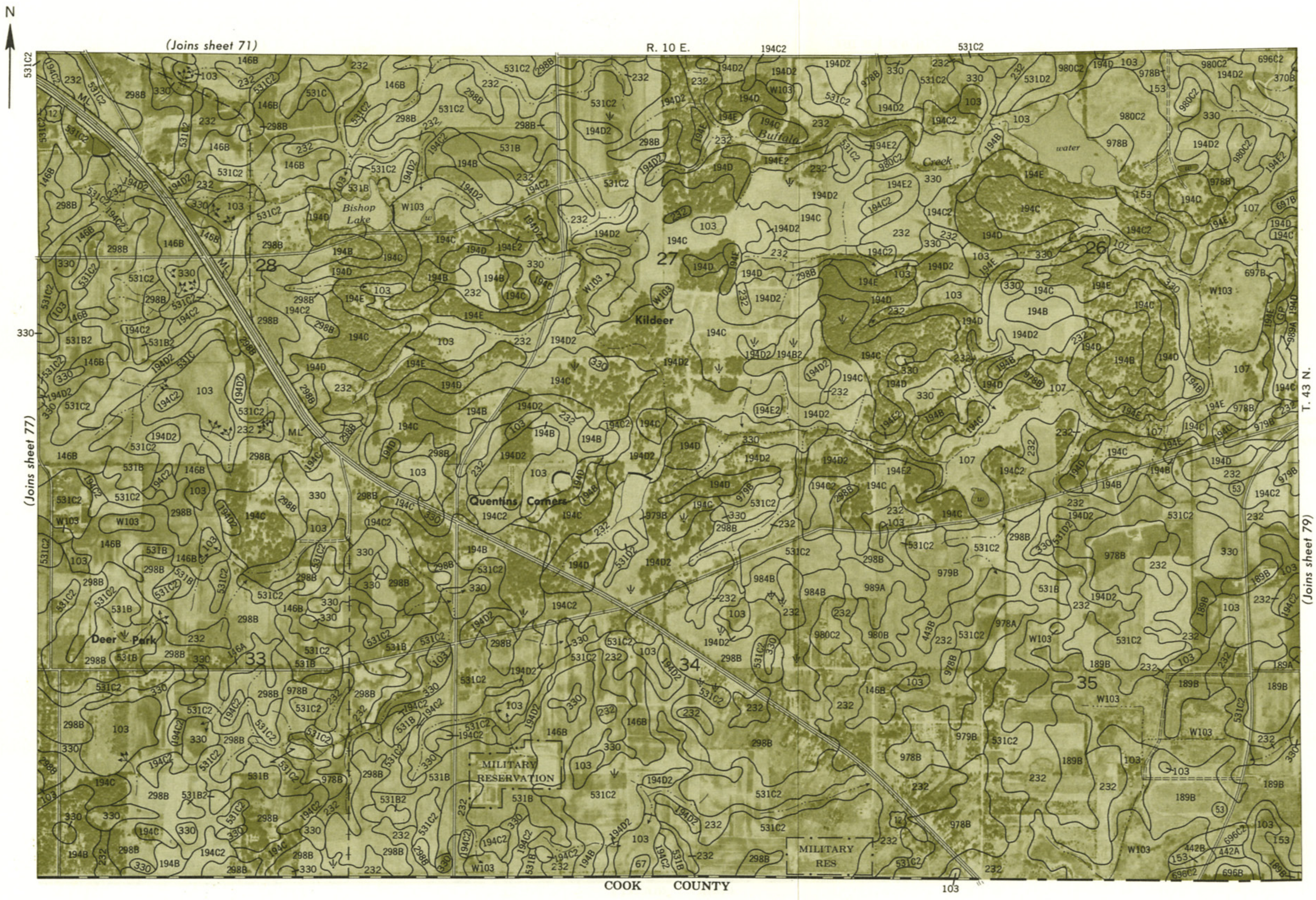
(Joins sheet 74)

(Joins inset, sheet 83)

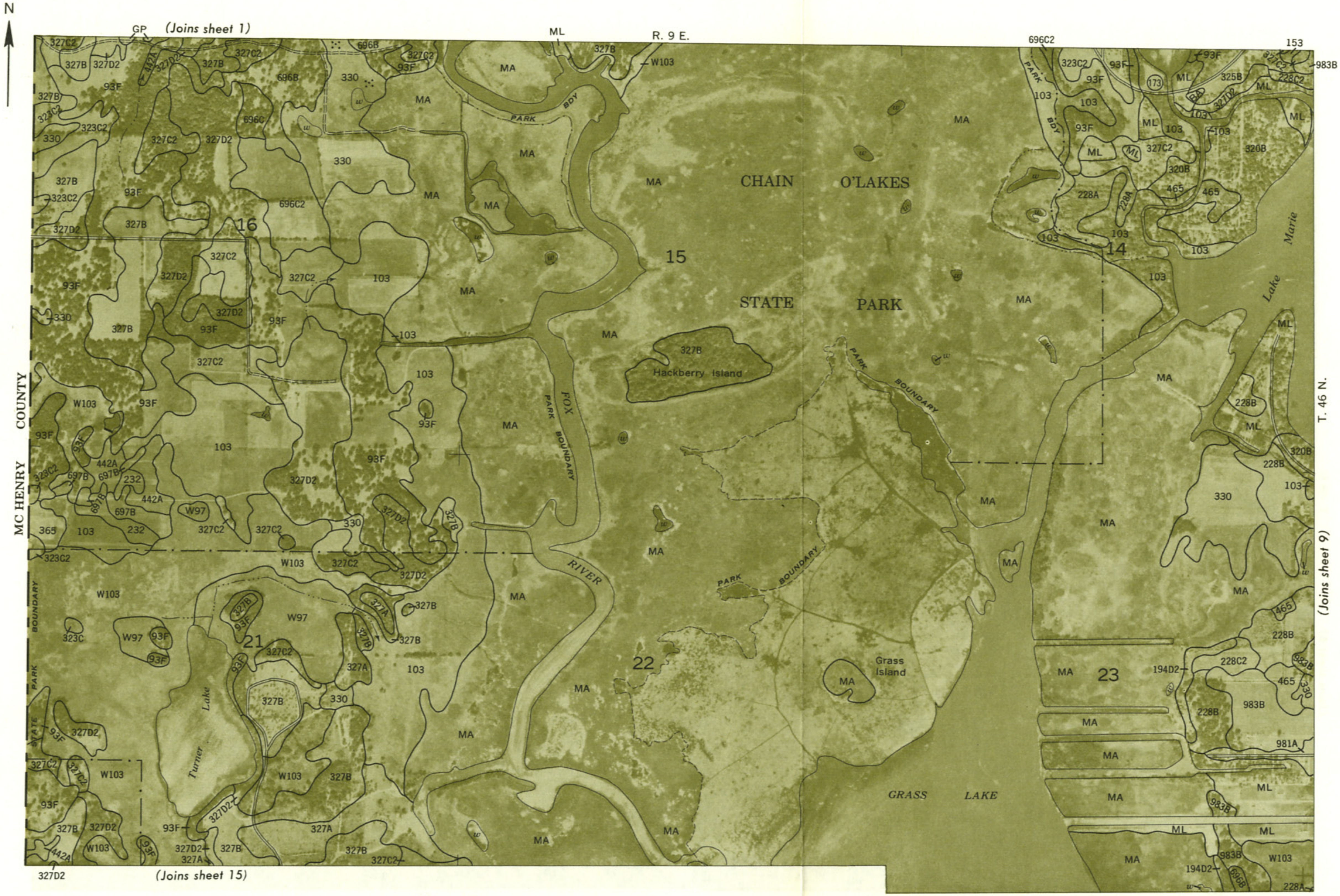
(Joins sheet 82)


N
(Joins sheet 69)
R. 9 E.
T. 43 N.
(Joins sheet 77)
St Marks Church
Barrington
CHICAGO AND NORTH WESTERN
Flint Creek
28
27
26
33
34
35
MC HENRY COUNTY
COOK COUNTY


N
R. 9 E.
R. 10 E.
(Joins sheet 70)
(Joins sheet 76)
(Joins sheet 78)
T. 43 N.
Barrington
25
29
30
31
32
36
Creek
Flint
Elgin
Eastern
COOK COUNTY


N
(Joins sheet 71)
R. 10 E.
T. 43 N.
(Joins sheet 77)
(Joins sheet 79)
Bishop Lake
Buffalo
Creek
water
Kildeer
Quentins Corners
Deer Park
MILITARY RESERVATION
MILITARY RES
28
27
26
33
34
35
COOK COUNTY


N
R. 10 E.
R. 11 E.
T. 43 N.
(Joins sheet 72)
(Joins sheet 78)
(Joins sheet 80)
Kildeer School
Long Grove
Long Grove Church
Buffalo Creek
25
29
30
31
32
36
COOK COUNTY


N
(Joins sheet 1)
R. 9 E.
CHAIN O'LAKES
STATE PARK
Hackberry Island
FOX RIVER
PARK BOUNDARY
Grass Island
GRASS LAKE
Turner Lake
Lake Marie
MC HENRY COUNTY
STATE PARK BOUNDARY
T. 46 N.
(Joins sheet 9)
(Joins sheet 15)
14
15
16
21
22
23

N

(Joins sheet 73)

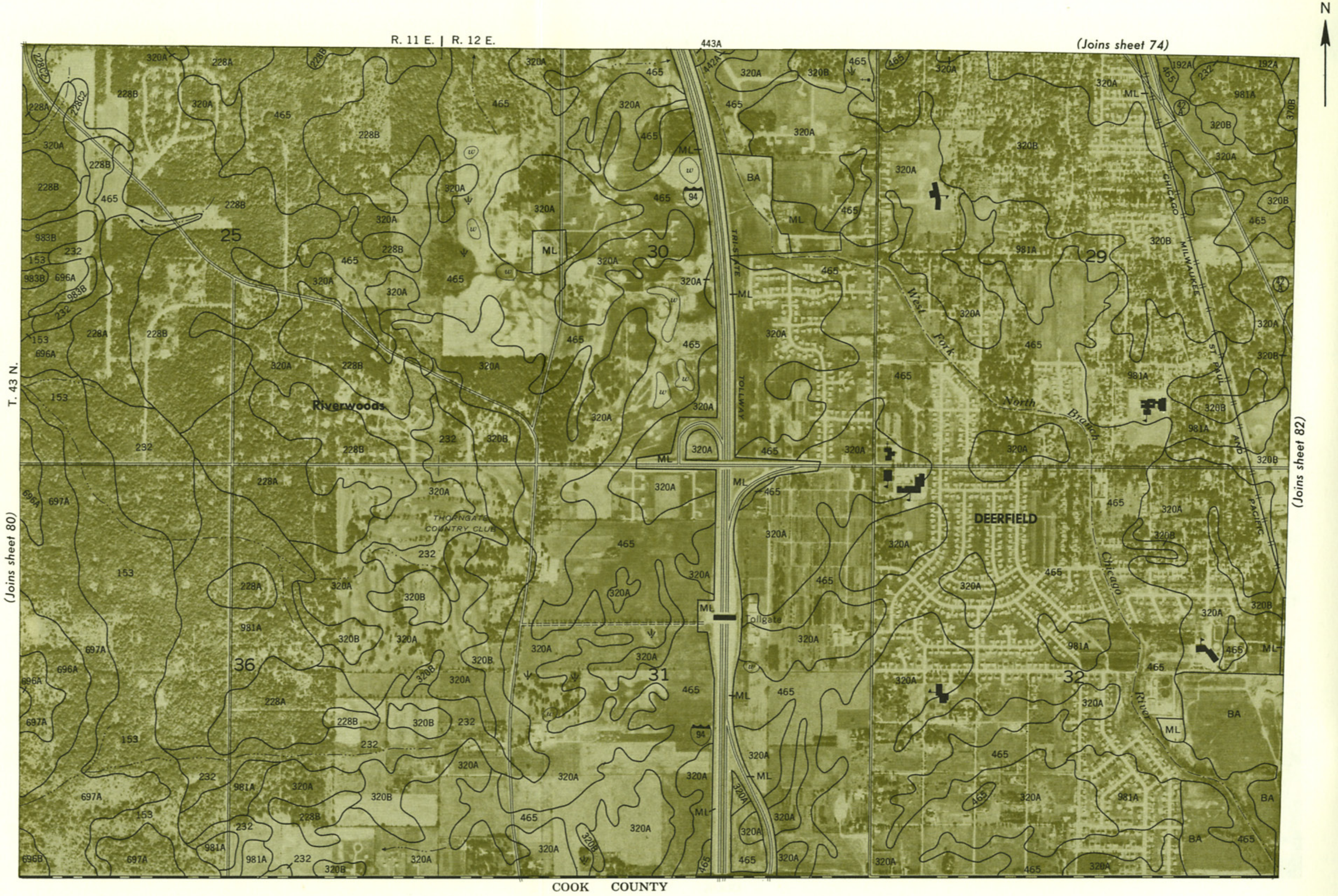
R. 11 E.

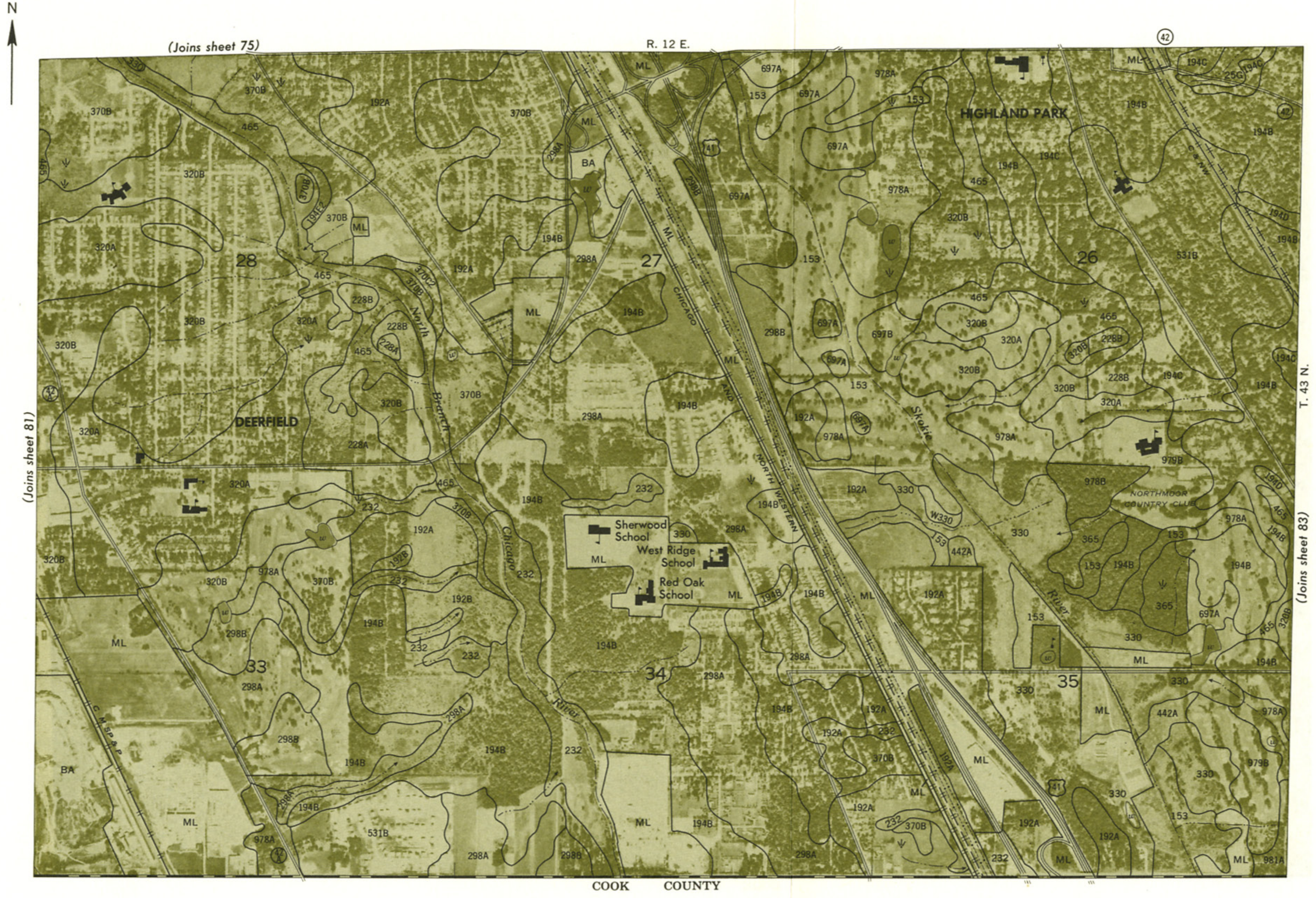
(Joins sheet 79)

T. 43 N.

(Joins sheet 81)

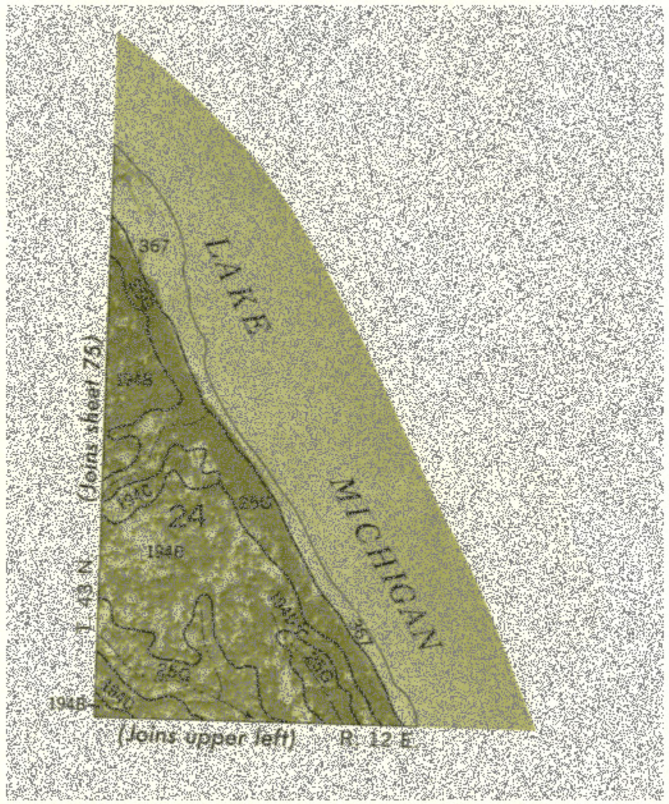
153 COOK COUNTY


N
R. 11 E. | R. 12 E.
(Joins sheet 74)
T. 43 N.
(Joins sheet 80)
(Joins sheet 82)
COOK COUNTY
Riverwoods
DEERFIELD
THORNGATE COUNTRY CLUB
TRI-STATE TOLLWAY
Tollgate
West Fork North Branch
Chicago River
CHICAGO MILWAUKEE ST. PAUL AND PACIFIC
25
30
29
36
31
32

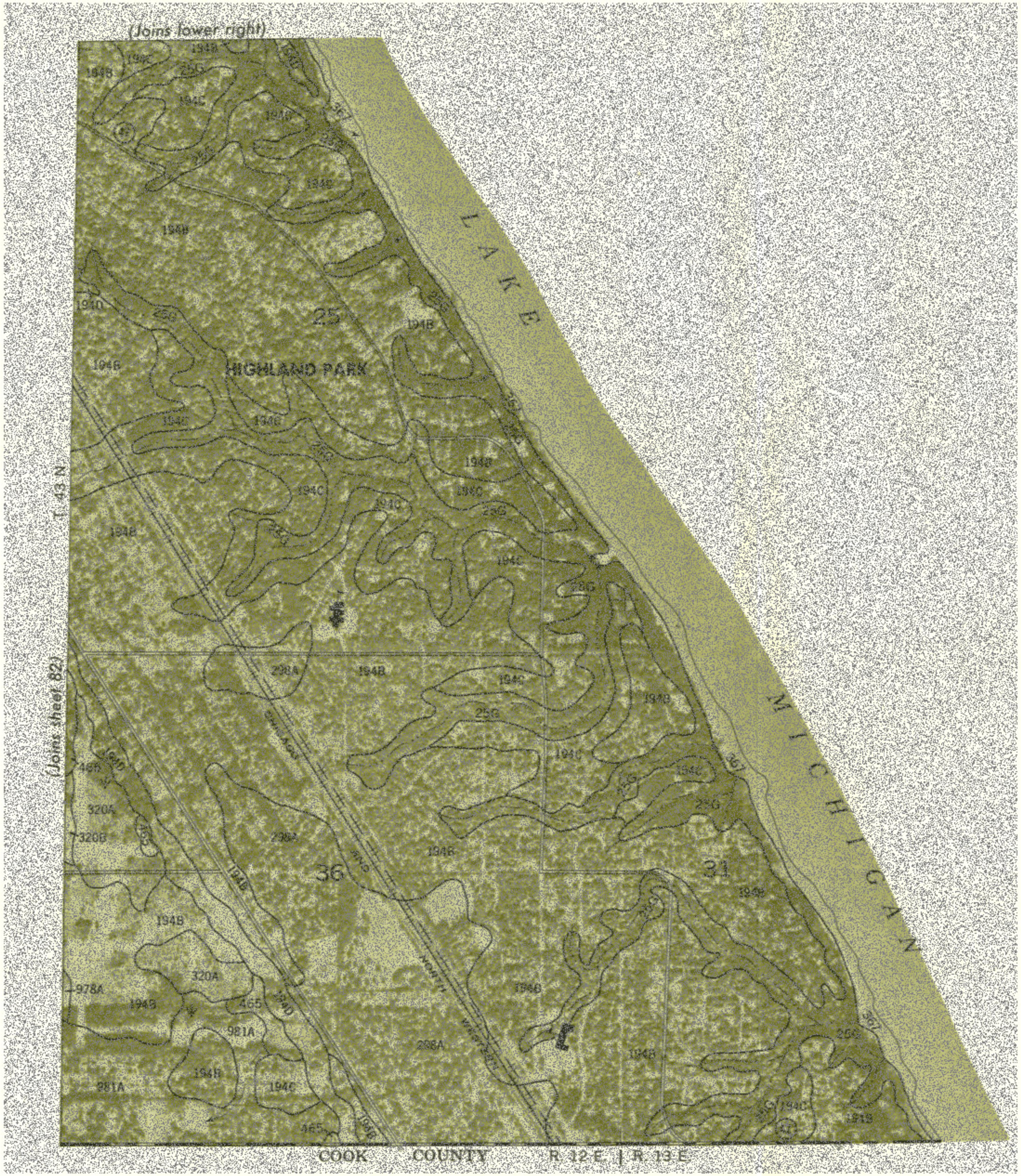

N
(Joins sheet 75)
R. 12 E.
(Joins sheet 81)
(Joins sheet 83)
T. 43 N.
HIGHLAND PARK
DEERFIELD
North Branch
Chicago River
CHICAGO AND NORTH WESTERN
Skokie River
NORTHMOOR COUNTRY CLUB
Sherwood School
West Ridge School
Red Oak School
28
27
26
33
34
35
C M St P & P
C & NW
COOK COUNTY

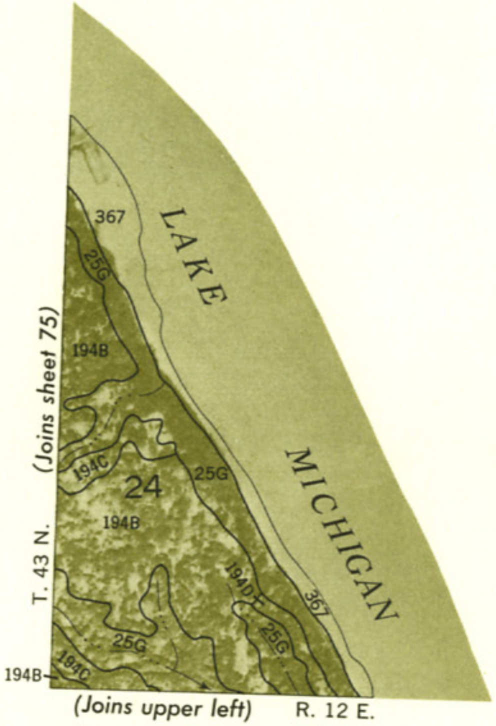
N

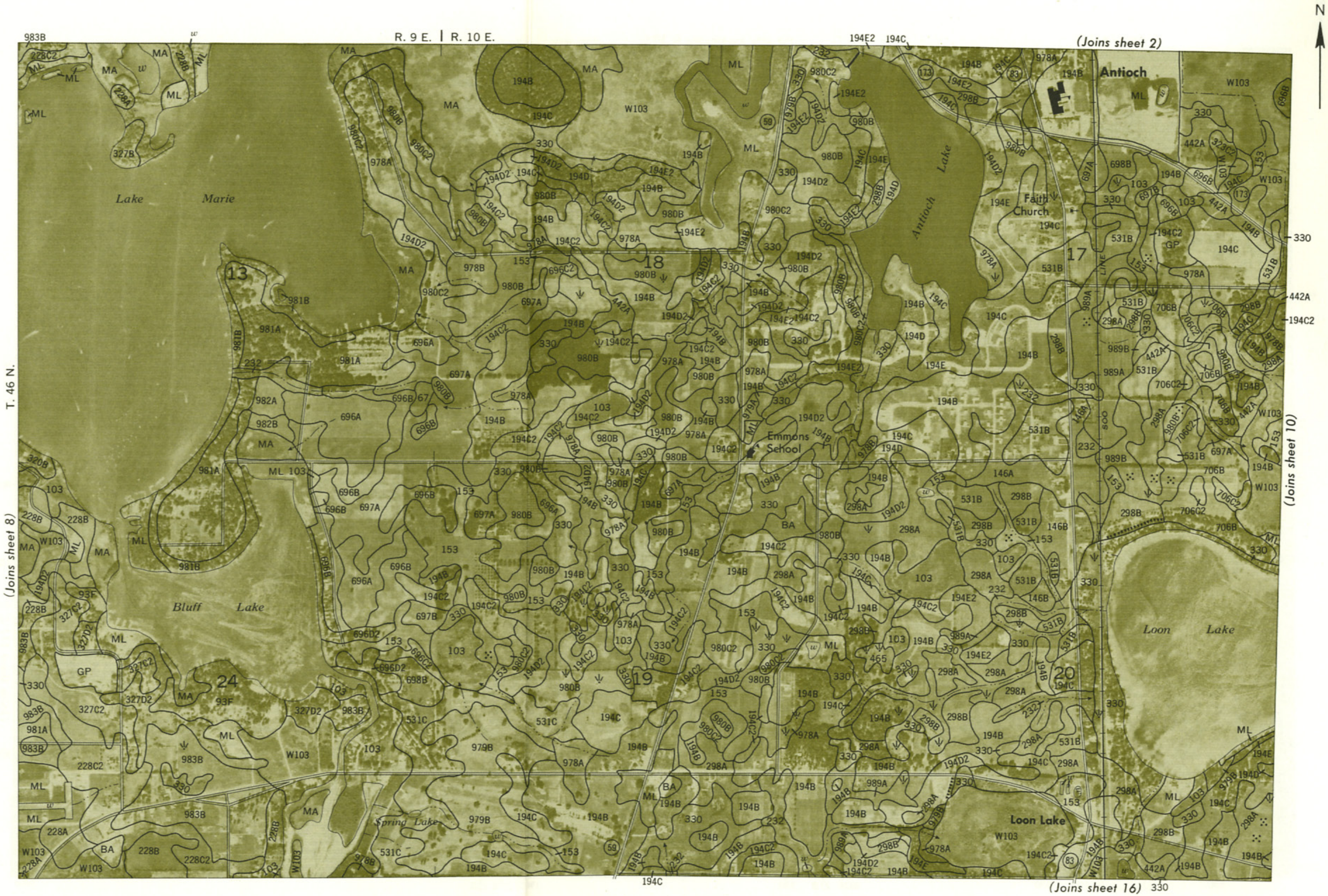

(Joins lower right)
LAKE
MICHIGAN
HIGHLAND PARK
25
36
31
T. 43 N.
(Joins sheet 82)
CHICAGO
AND
NORTH
WESTERN
367
COOK
COUNTY
R. 12 E. | R. 13 E.


367
LAKE
MICHIGAN
(Joins sheet 75)
24
T. 43 N.
(Joins upper left)
R. 12 E.

N


(Joins lower right)
LAKE
MICHIGAN
HIGHLAND PARK
25
36
31
T. 43 N.
(Joins sheet 82)
COOK COUNTY
R. 12 E. | R. 13 E.


LAKE
MICHIGAN
367
24
T. 43 N.
(Joins sheet 75)
(Joins upper left)
R. 12 E.


N
R. 9 E. | R. 10 E.
(Joins sheet 2)
(Joins sheet 8)
(Joins sheet 10)
(Joins sheet 16)
T. 46 N.
Lake Marie
Bluff Lake
Antioch Lake
Antioch
Faith Church
Emmons School
Loon Lake
Spring Lake
13
18
17
24
19
20